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HISTORY OF THE GREAT WAR
BASED ON OFFICIAL
DOCUMENTS

Veterinary Services

Edited by

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and

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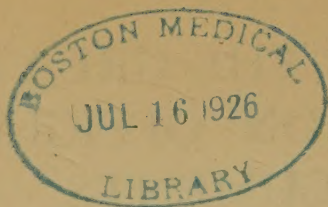
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PREFACE

It was not found possible to begin the preparation of the official Veterinary History of the Great War until August, 1923.

Except as regards the Western Front, for which a historical outline existed in an official publication, prepared at the instance of the Director of Veterinary Services in France soon after the cessation of hostilities, there was very little material of a narrative or connected nature available for the purposes of the history. The staffs of the veterinary directorates were not able to provide personnel during or after the war to prepare complete historical records. Consequently it has been necessary to depend largely on the contributions of individual officers who, from keenness and pride in the achievements of their corps during the war, had retained for their own interest records of the work done by themselves and those serving with them. These officers were dispersed throughout the Empire, and the time taken in correspondence with those at a distance has unavoidably delayed the production of the work. The rest of the history is the result of a laborious searching of the memory assisted by reference to the various files, technical reports, and other documents which had been carefully preserved to this end in the office of the Director-General, Army Veterinary Services.

It is evident that a historical account completed in these circumstances in the sixth year after the war might be, in some respects, inadequate and inaccurate. To guard against the latter risk, care has been taken to omit anything which could not be verified from official documents, so that the history may safely be taken as accurate as to facts.

There was no lack of statistical records, but it will be observed that relatively few are included in this volume. Statistical information, in detail, of the incidence of disease and mortality is very necessary at the time to the veterinary administration actively occupied in the control of animal wastage, but has very little, if any, retrospective value for the general reader. For the purposes of veterinary organization and administration in war, it is necessary to know the broad facts of what has happened in the past, and the scope of the present volume does not permit of any greater elaboration. The statistics which are given in this history comprise the periodical average percentage of animal mortality in the different theatres of war, the wastage for replacement, and the percentage of animals requiring veterinary hospital accommodation. Fluctuations over and above these broadly stated figures occurred, and will always occur, according to varying circumstances, and in the study of the figures included in this work these natural variations should always be borne in mind.

It will be noticed that there is a considerable difference in the form of the subject matter of the several chapters dealing with the veterinary work of the expeditionary forces. Some are almost entirely technical; others are concerned more with the general

military aspect of the campaign. This is an inevitable consequence of the individual nature of the contributions. Notwithstanding the desirability of uniformity in referring by name to individual officers in the various theatres, it was found impracticable in this respect to bring all the chapters into line. It would have been ungracious to delete piecemeal the names of officers where they had been included by contributors, and where they had been omitted it would have been impossible for the compiler to insert them with the completeness which alone could justify such action.

The chapter on the work of the Veterinary Services in East Africa is contributed by Lieut.-Colonel A. G. Doherty, M.C., an official of the East African Civil Veterinary Department, who was employed as Deputy Director of Veterinary Services and Remounts in that theatre.

Colonel J. Irvine Smith, C.B.E., Director of Veterinary Services of the Union Forces of South Africa, contributes the chapter dealing with the veterinary work in operations during the Rebellion in South Africa and against the Germans in South-West Africa.

The chapter concerned with the British forces in the Balkans is contributed by Brigadier-General F. Eassie, C.B., C.M.G., D.S.O., who was Director of Veterinary Services with those forces throughout the campaign.

A full account of the work in Gallipoli, Egypt and Palestine, is contributed by Colonel A. G. Todd, C.B.E., D.S.O., Deputy Director of Veterinary Services with the Egyptian Expeditionary Force.

The chapter dealing with veterinary work on the Western Front is compiled from an official outline prepared by the Veterinary Directorate, Headquarters in France, shortly after the war, and from other available material, including notably some contributions by Colonel F. W. Wilson, C.M.G., on work at the front. At first sight it will appear that the extent of this chapter is inadequate in comparison with that of the chapters dealing with the other expeditionary forces. When, however, it is considered that the chapters on the working of veterinary units, the chapter on surgery, the chapter on diseases, and substantial parts of other chapters, are chiefly concerned with veterinary work on the western front, it will be realised that a fair proportion of the available space has been reserved for the principal theatre of war.

Major A. J. Thompson, who served in India from 1914 to 1918, contributed most of the material from which the chapter dealing with India is compiled.

The chapter on the Veterinary Services on the Italian Front is contributed by Colonel F. W. Wilson, C.M.G., Deputy Director of Veterinary Services with the forces in Italy, and Lieut.-Colonel H. S. Mosley, D.S.O., who succeeded Colonel Wilson as Assistant Director of Veterinary Services on the reduction of that Force.

The first phase of the Veterinary Services in Mesopotamia is described by Colonel W. S. Anthony, C.M.G., who was Deputy Director of Veterinary Services with the Expeditionary Force in that theatre until October, 1916. The veterinary aspect of the second phase is contributed by Lieut.-Colonel A. J. Williams, D.S.O., who

was Assistant Director of Veterinary Services at Headquarters during the remainder of the war.

The account of the veterinary operations in North Russia is contributed by Major B. L. Lake, Assistant Director of Veterinary Services with the British contingent there.

A description of the veterinary work with the British Military Mission to South Russia is compiled from the reports of Lieut.-Colonel W. L. Harrison, C.B.E., T.D., who also contributes an account of his services in South Persia.

The chapter dealing with the veterinary side of the British Remount Commission is compiled chiefly from the reports of Lieut.-Colonel A. Olver, C.B., C.M.G., who was Deputy Director of Veterinary Services of the Commission from 1st July, 1917, to the end of its operations.

The veterinary working of the Remount Commission in Uruguay is compiled from a report by Lieut.-Colonel Watkins-Pitchford, C.M.G., who was senior veterinary officer with the commission.

It is unfortunate from a historical point of view that material was not available for an account of the veterinary work of the Remount Purchasing Commission which went to the Argentine.

Major F. T. G. Hobday, C.M.G., who was employed as a surgical specialist in France, contributes the chapter on surgery.

The chapter on the working of the camel hospitals in Egypt is contributed by Major D. S. Rabagliati, O.B.E., an official of the Egyptian Ministry of Agriculture, who served with the Army Veterinary Corps in Egypt during the war.

Lieut.-Colonel R. C. Cochrane, C.B.E., who was officer i/c records during the last year of the war, contributes the chapter which describes the working of the record office.

The chapter on the army veterinary stores is compiled from an official report prepared early in 1919.

The chapters which describe in detail the working of veterinary units are compiled from reports specially prepared for historical purposes by individual executive officers during the war.

Major H. E. Gibbs, D.S.O., contributes the section dealing with the construction of veterinary hospitals.

The onerous duty of co-ordinating the various parts of this history and preparing the whole for publication has been performed by Lieut.-Colonel J. W. Rainey, C.B.E., who, in addition, has contributed the chapters dealing with the preparation for war and mobilization; the provision and training of personnel; administration; the depot, A.V.C.; the R.S.P.C.A.; animal diseases; animal management; the transportation of animals, and the disposal of animals.

Finally, it should be recorded that the issue of this history is due in no small measure to the advocacy of the present Director-General of the Army Veterinary Services, Major-General W. Dunlop Smith, C.B., C.M.G., D.S.O., who has also used his influence and energy in obtaining from contributors the necessary material for the work and has assisted the compiler in every possible way.

21st April, 1924.

L. J. B.

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ABBREVIATIONS

A.A.G.	..	Assistant Adjutant-General.
A.A.V.C.	..	Australian Army Veterinary Corps.
A.D.O.S.	..	Assistant Director of Ordnance Services.
A.D.V.S.	..	Assistant Director of Veterinary Services.
A.L.H.	..	Australian Light Horse.
A.N.V.C.	..	African Native Veterinary Corps.
A.O.D.	..	Army Ordnance Department.
A.P.M.	..	Assistant Provost Marshal.
A.Q.M.G.	..	Assistant Quartermaster-General.
A.S.C.	..	Army Service Corps.
A.T.	..	Ammunition Transport (Cart).
A.V.C...	..	Army Veterinary Corps.
A.V.O.	..	Administrative Veterinary Officer.
A.V.S...	..	Army Veterinary Services.
B.E.F.	..	British Expeditionary Force.
B.O.	..	British Officer.
C.A.V.C.	..	Canadian Army Veterinary Corps.
C.H.D.	..	Convalescent Horse Depot.
C.T.C.	..	Camel Transport Corps.
D.A.D.V.S.	..	Deputy Assistant Director of Veterinary Services.
D.D.V.S.	..	Deputy Director of Veterinary Services.
D.Q.M.G.	..	Deputy Quartermaster-General.
D.R.T.	..	Director of Railway Transport.
D.V.S...	..	Director of Veterinary Services.
E.A.V.C.	..	East African Veterinary Corps.
E.E.F.	..	Egyptian Expeditionary Force.
E.V.O.	..	Embarkation Veterinary Officer.
F.R.C.V.S.	..	Fellow of the Royal College of Veterinary Surgeons.
F.V.D.	..	Field Veterinary Detachment.
F.V.S...	..	Field Veterinary Section.
G.H.Q.	..	General Headquarters.
G.O.C...	..	General Officer Commanding.
G.R.O.	..	General Routine Order.
G.S.	..	General Service.
I.C.C.	..	Imperial Camel Corps.
I.C.V.D.	..	Indian Civil Veterinary Department.
I.G.C.	..	Inspector-General of Communications.
I.L.H.	..	Imperial Light Horse.
I.S.V.D.	..	Indian Subordinate Veterinary Department.
K.A.R.	..	King's African Rifles.
K.A.R.M.I.	..	King's African Rifles Mounted Infantry.
L.G.S.	..	Light General Service (Wagon).
L. of C.	..	Lines of Communication.
M.E.F.	..	Mediterranean Expeditionary Force.
M.R.C.V.S.	..	Member of the Royal College of Veterinary Surgeons.
M.V.S.	..	Mobile Veterinary Section.
N.C.O.	..	Non-commissioned Officer.
N.Z.A.V.C.	..	New Zealand Army Veterinary Corps.
O.C.	..	Officer Commanding.
P.V.O.	..	Principal Veterinary Officer.
R.A.M.C.	..	Royal Army Medical Corps.
R.A.V.C.	..	Royal Army Veterinary Corps.
R.E.	..	Royal Engineers.
R. & F.	..	Rank and File.
R.F.A.	..	Royal Field Artillery.
R.G.A.	..	Royal Garrison Artillery.
R.H.A.	..	Royal Horse Artillery.
R. of O.	..	Reserve of Officers.
R.S.P.C.A.	..	Royal Society for the Prevention of Cruelty to Animals.
R.T.O.	..	Railway Transport Officer.
S.A.V.C.	..	South African Veterinary Corps.
S.D.	..	Service Dress.
S.S.	..	Steam-ship.
S.V.O...	..	Senior Veterinary Officer.
T.C.	..	Tank Corps.
T.F.	..	Territorial Force.
V.E.S...	..	Veterinary Evacuating Station.
V.O.	..	Veterinary Officer.
W.A.A.C.	..	Women's Army Auxiliary Corps.

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CHAPTER I.

PREPARATION FOR WAR AND MOBILIZATION.

SO far as the Army Veterinary Service is concerned, the years that lay between the end of the South African War (1899-1902) and the beginning of the Great War constituted the period of preparation.

The veterinary experiences of the South African War were valuable chiefly for the undeniable evidence they gave of the need for a properly organized Army Veterinary Service.

The old system, whereby the veterinary duties of the army were carried out, as far as possible, by regimental veterinary officers with the aid of farriers of the regiments concerned, was found to be utterly inadequate for the requirements of war on a large scale. The experience of the South African War showed the absolute necessity of having fully trained subordinate personnel to assist veterinary officers in the treatment and nursing of sick and wounded animals. The assistance rendered by the Government of India during that war, in despatching field veterinary hospitals, gave ample proof of the contention that only by the employment of a trained body of men would it be possible, in modern warfare, to minimise losses in the field.

Consequently, in November, 1902, on the suggestion of Major-General H. Thomson, the Director-General of what was then the Army Veterinary Department (composed only of officers), a committee was assembled, under the chairmanship of the Earl of Hardwicke (Parliamentary Under-Secretary of State), to enquire into the conditions affecting the officers of the Army Veterinary Department, and to suggest remedies. This committee, whose final report was submitted early in 1903, recommended the formation of an Army Veterinary Corps of N.C.Os. and men to assist veterinary officers and, at the same time, the grant of combatant rank and titles to the latter. These proposals were sanctioned by the Royal Warrant of October 5th, 1903, and steps were at once taken to form two veterinary hospitals.

Approval was given for cavalry rates of pay for N.C.Os. and men.

Transfers (voluntary) from cavalry and artillery were called for, with the result that, after some delay, sufficient were obtained to make a start with one hospital at Woolwich and one at Aldershot.

The N.C.Os. and men formed the Army Veterinary Corps, while the officers remained in the Army Veterinary Department, a somewhat anomalous arrangement which was subsequently remedied.

In February, 1904, the addition of a quartermaster to the Army Veterinary Department was sanctioned; this officer's duty was the care of veterinary stores at Woolwich, subject to the authority of the principal veterinary officer of the corps.

Early in 1904 an establishment of eight veterinary hospitals in South Africa was approved, but before any definite action could be taken it was decided that, as a reduction of the number of animals was probable, five hospitals would suffice for the requirements of that command; these were formed by transfers from other units in a manner similar to that adopted at home, the total establishment of N.C.Os. and men for that country being :—

Farrier quartermaster-serjeants	..	..	..	..	5
Serjeant-farriers	..	..	..	..	5
Shoeing-smiths	..	..	..	..	10
Serjeants	..	..	..	..	10
Corporals	..	..	..	..	18
Privates	..	..	..	..	30

with native personnel in addition.

About the same time a small establishment was sanctioned for Egypt.

Towards the end of 1904, it was conceded that the organization of the Army Veterinary Corps was inadequate, and consequently the Treasury was approached with a view to the increase and reorganization of its numbers and its division into definite units. This received sanction in February, 1905, and the N.C.Os. and men were increased sufficiently to provide hospitals at Woolwich, Aldershot, Bulford and the Curragh* and provide for emergency. These additions, however, were only obtained by the sacrifice of fifteen officers who, it was considered, might be spared for a time, at all events. The total numbers sanctioned were :—

Serjeant-majors (warrant officers)	..	..	..	2
Farrier quartermaster-serjeants	..	..	..	8
Serjeant-farriers	..	..	..	13
Serjeants	..	..	..	21
Corporals	..	..	..	35
Shoeing-smith corporals	..	..	..	2
Shoeing-smiths	..	..	..	18
Privates	..	..	..	122
Total	..	..	221	

The formation of the veterinary hospitals, apart from any question of economy in the treatment of sick animals, provided for :—

- (1) Training of officers and other ranks in military and technical duties.
- (2) Veterinary research.
- (3) Standardization in dietetics and treatment.
- (4) Proper centres for the mobilization of veterinary units.

In May, 1905, a proposal was put forward to allow one half of the total number of shoeing-smiths to be shoeing-smith corporals. This was ultimately sanctioned and given effect to on April 1st, 1906, and at the same time the officers of the Army Veterinary Department were amalgamated with the N.C.Os. and men, forming a

* This detachment was not completed until April, 1906.

homogeneous corps to be known as the "Army Veterinary Corps," taking status and precedence after the Royal Army Medical Corps. Officers above the rank of Lieut.-Colonel were to be termed the Army Veterinary Staff,* and the whole designated "The Army Veterinary Service" (Royal Warrant February 15th, 1906).

The two warrant officers and two farrier quartermaster-serjeants at home were to be located at Woolwich and Aldershot with a view to these stations being used on mobilization as training depots for drafts. Later, Woolwich was constituted the depot of the corps, and it was arranged that all reliefs from foreign stations should proceed there in the first instance.

It was found that the term "Veterinary Field Hospital Sections I and II" was inconvenient and failed to convey any definite idea as to what constituted a unit of the corps. Consequently, it was decided that the term "Veterinary Section" should be used in future for what was previously a section of a field veterinary hospital, and that such a "Veterinary Section" should constitute a unit of the corps, and be given a definite establishment of:—

Veterinary officers	..	..	..	..	..	..	2
Serjeant	..	..	..	..	..	..	1
Farrier-serjeant	..	..	..	..	..	..	1
Shoeing-smiths	..	..	..	..	..	..	2
Saddler	..	..	..	..	..	..	1
Corporals	..	..	..	..	..	..	2
Privates	..	..	..	..	..	..	12
Horsekeepers (specially enlisted or Reserve)	..	..	..	..	..	..	83

During peace one veterinary officer would suffice, and the saddler and horsekeepers would only be provided on mobilization.

On April 4th, 1906, the Director-General, Army Veterinary Service, who by the Royal Warrant of October 5th, 1903, was created Colonel (ranking as Major-General), was granted the honorary rank of major-general in the army, the first recipient of this distinction being Major-General H. Thomson, the Director-General under and by whom the organization outlined herein was planned and initiated.

About this time Standing Orders for the Army Veterinary Corps were issued by official authority. These described the system of training for the N.C.Os. and men of the corps, and the subjects in which it was necessary for them to pass before becoming eligible for promotion to the various ranks. Revised Regulations for the Army Veterinary Service were also completed and issued.

In 1907, a large mobilization and reserve store was completed at Woolwich, mobilization stores also being provided at Aldershot, Bulford and the Curragh. Six sections of the Army Veterinary Corps were kept complete with equipment in readiness for active service, if required, and a base veterinary store depot was laid down in war establishments.

The farriery staff of the Army Veterinary Corps having been

* This designation was subsequently abolished, and the officers concerned were shown as "Removed from the Corps and still on the active list."

found to exceed requirements, and there being no means of promoting a N.C.O. of the rank of serjeant unless to warrant officer, some reorganization of the corps became necessary, and it was proposed to reduce the farriery staff to shoeing-smith corporal as the highest rank in that portion of the corps; to institute the rank of staff-serjeant between serjeant and serjeant-major; and to make all classes, including the shoeing-smiths, eligible for higher promotion. These principles received War Office approval.

In 1907 the first attempt was made to create a separate Veterinary Directorate under the Quartermaster-General instead of the Director of Transport and Remounts as formerly. A compromise was effected by placing the Director-General, Army Veterinary Service, in direct communication with the Quartermaster-General on all matters connected with officers. Subsequent attempts were made to obtain complete autonomy, but it was not until 1913 that Army Council approval was given and a Veterinary Directorate, immediately under the Quartermaster-General, was established.

The organization of the Army Veterinary Corps, Territorial Force, took some time to accomplish. The Secretary of State agreed that, in the first instance, the question should be referred to the veterinary profession; accordingly, the matter was represented in full by the Director-General, Army Veterinary Service (Major-General F. Smith) at a meeting of the Council of the Royal College of Veterinary Surgeons on January 10th, 1908. The proposals were approved and Army Order 203 of 1910, laid down the conditions under which the A.V.C., Territorial Force, came into being.

The formation of a Special Reserve of Officers, Army Veterinary Corps, was approved in 1909 (Army Order 181).

A revision of the subjects for examination for promotion of all ranks was published in Army Order 71 of 1909. It constituted an important step in the military training of veterinary officers.

The notable developments in the preparation of the Army Veterinary Service for war that are mentioned as having taken place during the years 1907 to 1910 were carried out during the Director-Generalship of Major-General F. Smith.

On October 15th, 1910, when Major-General R. Pringle became the head of the Army Veterinary Service, the establishment of the Army Veterinary Corps was as follows:—

Officers	..	..	..	..	..	..	..	160
Quartermaster	..	..	..	..	..	..	..	1
Serjeant-majors	..	..	..	..	..	..	..	2
Staff-serjeants	..	..	..	..	..	..	..	13
Serjeants	..	..	..	..	..	..	..	18
Lance-serjeants	..	..	..	..	..	..	..	7
Corporals	..	..	..	..	..	..	..	23
Lance-corporals	..	..	..	..	..	..	..	13
Shoeing-smith corporals	..	..	..	..	..	..	..	14
Shoeing-smiths	..	..	..	..	..	..	..	14
Privates	..	..	..	..	..	..	..	113

making a total of 378 of all ranks.

Army Order 284 of 1912 sanctioned the changes of titles of Principal Veterinary Officer and Administrative Veterinary Officer to that of Assistant Director of Veterinary Services.

Several attempts were made from time to time to improve the field veterinary organization by the provision of some connecting link between field units and veterinary hospitals on the lines of communication. The question was finally solved in 1913, when approval was given to the creation of mobile veterinary sections. One of these units was sanctioned for each cavalry brigade and infantry division allotted to the British Expeditionary Force on mobilization.

Up to the end of 1913, no provision had been made for the formation of T.F. veterinary units to deal with sick and inefficient animals of that force on mobilization. Approval, however, was given in Army Order 66 of 1914 for the establishment of seven veterinary hospitals, T.F.

The "Veterinary Manual (War)," referred to in Chapter X of Field Service Regulations, Part II, was prepared and ready for issue in August, 1914.

During the whole of the period subsequent to the South African War, the matter of veterinary equipment received very careful attention; many modifications were made from time to time, the object being to eliminate anything that, in the advance of scientific knowledge, was shown to be superfluous, while retaining and, if necessary, adding to essentials.

The result of this forethought was that the equipment as it existed on mobilization in 1914 was found, on the whole, adequate in design and detail during the entire war.

Every effort was made in the years preceding the war to obtain undertakings from approved civilian veterinary practitioners to serve in a civil capacity with the Army Veterinary Corps both for corps and remount duties. The registers which were made of practitioners willing to assist in this scheme proved most valuable.

Another item of preparation, which proved of value in the provision of subordinate personnel, was the arrangement whereby 498 cavalry Class "D" reservists were allotted to the Army Veterinary Corps on mobilization, in order to complete the war establishments of the veterinary hospitals of the B.E.F. in respect of "horsekeepers" or grooms. Sir John Moore, in his book, "Army Veterinary Service in War," says truly of these reservists:

"The majority of them transferred to the Army Veterinary Corps, became non-commissioned officers and, together with our own well-trained and proved Corps N.C.Os., became the backbone of the Veterinary Service throughout the war."

It was necessary to allot these men to the corps because, including reservists, the number of A.V.C. subordinate personnel was far less than that required to complete war establishments on mobilization.

Mobilization.

There were two distinct phases of mobilization.

The first phase was concerned with the hurried assembly and despatch overseas of the British Expeditionary Force. This matter was largely one of automatic compliance with arrangements which were already complete. (Mobilization Orders to Commands.)

The necessary officers were, for the most part, available from those on the Active List, Reserve of Officers, and Special Reserve. These had been earmarked for the various duties.

Other ranks were provided from serving soldiers and reservists, A.V.C., with the important addition of the above-mentioned cavalry reservists.

Veterinary equipment for the entire force was perfectly ready.

The short period of concentration prior to embarkation was not, however, free from veterinary difficulties, although the fine dry weather and the early autumn season afforded most favourable conditions, especially for the animals picketed in the open. The animal strength of the mobilizing units had to be augmented quickly to the numbers required by war establishments, and this could only be done by bringing in a proportion of remounts from civilian sources. The services of a veterinary officer are required at every stage of the process of the conversion of a remount into a war-horse, and this urgent attendance greatly increased the share of the Army Veterinary Service in the business of mobilization.

It was necessary to make many arrangements for the eleventh-hour evacuation, to the veterinary hospitals in the home commands, of newly-acquired animals which became casualties on account of unsoundness, sickness, or accidental injuries.

The second phase, or period, of mobilization coincided with the formation and despatch overseas of the New Armies and their L. of C. units. This second phase of mobilization was also much concerned with the provision of veterinary services at home. The United Kingdom was virtually a L. of C. for the Expeditionary Forces, and the question of providing for its needs would appear to fall most naturally under the term "mobilization."

In the opening weeks of the war there were available for purposes of veterinary accommodation, the small veterinary hospitals at Woolwich, Aldershot, Bulford, and the Curragh, the T.F. divisional veterinary hospitals in certain county towns, and regimental sick lines at various mounted stations. All this accommodation put together could not deal with a tithe of the requirements, and it became necessary hurriedly to expand existing hospitals and to form new ones. Full advantage was taken of stabling and sites allotted for veterinary purposes under the billeting schemes which came into force on mobilization in the home commands.

The first large new veterinary hospitals, each for 1,000 patients, were formed in proximity to the great reception remount depots at Ormskirk, Swaythling and Shirehampton. The need for veterinary hospital accommodation and A.V.C. personnel at these centres did

not relax throughout the war, but elsewhere the requirements fluctuated in accordance with the distribution of troops during their mobilization and training.

The brunt was for a long time borne by the Southern Command, and extended over a period which corresponded with the mobilization and training of most of the divisions of the New Armies as well as a portion of the Canadian Expeditionary Force and many Territorial Force formations.

The veterinary hospital accommodation at Bulford, Tidworth and Larkhill was expanded to the greatest possible extent; small centres for the treatment of sick were established, wherever practicable, in the vicinity of mobilizing divisions, and numbers of sick animals that were fit to travel, and could be accommodated, were sent to veterinary hospitals in other commands.

All these measures were insufficient at a time of exceptionally high pressure when the rate of admissions of sick animals from remount depots and horse ships was at its highest, and division after division was evacuating its casualties before proceeding overseas, consequently the expedient was tried of boarding-out sick animals with selected civilian veterinary practitioners at a fixed daily rate to include food, medicines, accommodation and treatment. The amount at first fixed was 5s. a day for each horse, but this was subsequently reduced as it was found that in some instances sub-contracts had been made by practitioners for the accommodation of horses at grass at a very low figure. The expedient led to many serious difficulties, and was abandoned as soon as possible.

The demand for sufficient veterinary hospital accommodation in the Southern Command was not met until halfway through the war, when Pitt Corner Camp at Winchester was handed over to the Army Veterinary Service as a veterinary hospital. Although the stabling at this camp could contain more than 3,000 horses, yet, for a long time after it was appropriated, the entire accommodation was fully required for sick and injured animals.

During the second winter of the war the veterinary work in the Southern Command was temporarily lightened by the move of many divisions of the New Armies to the Northern and Eastern Commands for training purposes. This movement necessitated considerable addition to the veterinary hospital accommodation in the Northern Command, notably at York, Doncaster, Catterick Bridge, and Newcastle-on-Tyne.

The nine well-equipped and organized Territorial Force divisional veterinary hospitals (each for 500 patients) located in midland and eastern towns helped to provide adequate veterinary hospital accommodation for the sick animals which were evacuated from divisions mobilizing in the Eastern Command. Other circumstances which favoured veterinary arrangements in the Eastern Command were the better rail and road communications, and the ease of obtaining local civil professional assistance.

The veterinary hospital at Woolwich was expanded to accommodate 1,000 patients, and for three years it was full to overflowing with patients evacuated from mobilizing and training units and from the large remount depot at that station.

The Aldershot Command during the first two and a half years of the war was called upon to contribute its full share of veterinary services. The existing veterinary hospital accommodation had, soon after the outbreak of war, to be expanded to that of two reserve veterinary hospitals, each for 1,000 patients, in order to accommodate large numbers of sick animals evacuated from mobilizing divisions and remount depots. In addition, these hospitals were used as places of mobilization and training for most of the veterinary units being formed for service overseas. Towards the end of the war, it became possible to make substantial reductions in veterinary establishments in this command.

Heavy demands were only made on the veterinary resources of the Irish Command for a relatively short period while formations were training before going overseas. Nevertheless it was necessary to increase the veterinary hospital accommodation at the Curragh to an establishment for 500 patients and to form subsidiary centres for the treatment of sick in Dublin and at other stations.

During the early part of the war the mobilizing and training of units of the Welsh divisions, in addition to the operations of the Remount Department, called for extensive veterinary arrangements in the Western Command. On the departure of the Welsh divisional units, the veterinary work of the Western Command was concerned chiefly with the accommodation and treatment of sick animals evacuated from the great remount depot at Ormskirk and from the many smaller remount depots which were located in the north-west of England. The establishment of the veterinary hospital at Ormskirk was that of a reserve veterinary hospital for 1,000 patients, but eventually it had to be greatly expanded and provided with additional personnel.

The veterinary hospital requirements of the Scottish Command were met by the Lowland divisional hospital at Stirling, and the establishment of temporary centres elsewhere as required.

The many fluctuations of the veterinary hospital requirements of the several commands were met as far as possible by the following arrangements :—

- (1) The transfer of sick animals fit to travel from one hospital to another in the same command.
- (2) The transfer of sick animals to veterinary hospitals in another command.
- (3) The posting of subdivisions of A.V.C. subordinate personnel from one veterinary hospital to another in the same or another command. Each subdivision contained the personnel required to deal with 250 sick animals.

The total number of veterinary units mobilized completely in

the United Kingdom for service overseas was approximately as follows :—

First Phase :—

6 veterinary hospitals, each for 250 patients.

11 mobile veterinary sections.

2 base depots of veterinary stores.

Second Phase :—

20 veterinary hospitals for 1,000 or more patients

80 mobile veterinary sections.

4 base depots of veterinary stores.

In addition to the mobilization equipment of veterinary units, the requirements of field units had to be met, and priority was always given to the latter. No field formations ever left the United Kingdom deficient in A.V.C. personnel or equipment.

Experience showed that successful mobilization, as far as personnel and material were concerned, depended upon the following factors :—

1. Anticipation of requirements in personnel and stores.

2. Formation of "pools" of personnel. Pools of officers, A.V.C., eligible for service overseas were formed, chiefly at Aldershot and Woolwich, with smaller concentrations at other veterinary hospitals at home. The weekly returns of officer personnel from these stations gave by name, in order of priority, the officers who were physically fit and ready for overseas.

On account of the pressing needs of veterinary hospitals everywhere in home commands, it was not possible until late in the war to form an adequate pool of N.C.Os. and men at the depot ; consequently the pool had to be spread over many units. The officer i/c records then took the personnel required for mobilizing units from wherever they could best be spared. To enable him to do this with as little inconvenience to units as possible, he was kept supplied by the War Office with weekly returns showing the proportion of subordinate personnel to animals under treatment in each veterinary hospital.

3. Harmonious and close co-operation between the following pairs of workers :—

(a) Officer i/c Records and O.C. Depot.

(b) Officer i/c Records and Os.C. Units.

(c) Officer i/c Records and Veterinary Directorates of Home Commands.

(d) Veterinary Directorates and other branches in Home Command Headquarters.

A circumstance which at first caused much confusion on mobilization, during the second phase, was the eleventh-hour discovery of mange among the horses of a combatant mounted unit due shortly to embark.

The delay which necessarily occurred in dealing with a large number of reports arriving about the same time made it necessary to have some automatic arrangement whereby the matter could be

adjusted on the spot as completely as possible without waiting for particular directions. The arrangement which, though by no means perfect, proved the best practicable means of dealing with this hindrance to mobilization, was embodied in an instruction containing the following principles :—

When an outbreak of mange was discovered in a mounted unit shortly to embark for overseas, the animals, after examination, were classified :—

(a) Diseased. (b) In contact. (c) Not in contact.

Those classified (a) were evacuated to a veterinary hospital and replaced by remounts. Those classified (b) were completely dressed under veterinary supervision with a parasiticide in aqueous solution, when they were allowed to proceed with the unit.

The following example of the routine of mobilization of a veterinary unit may not be out of place in this history, as it describes what actually occurred :—

1. A request was received from an Expeditionary Force for a veterinary hospital for 1,000 patients.

2. The war establishment was duly ascertained, and the unit was given a numerical designation as shown by the sequence in the Mobilization Book.

3. Approval was obtained from the Director of Staff Duties for the formation of the unit. In the later stages of the war the Director of Staff Duties dealt with all requests for the mobilization of new units at a daily conference, a system which greatly facilitated matters.

4. A place of mobilization was arranged where the best accommodation was available, in telephonic consultation with D.Ds.V.S. of commands.

5. A letter was written informing the headquarters of the command in which the unit was to be mobilized, and asking for the necessary local arrangements to be made.

6. A copy of the letter (5) was sent to the officer i/c records, officer i/c Army Veterinary Stores, O.C. Depot, and to each branch in the War Office concerned in the equipment of the unit with horses, vehicles, and stores, as laid down in War Establishments and Mobilization Store Tables.

7. A commanding officer was selected. If no officer with the necessary experience and seniority was available at home, the B.E.F. was asked to send one to England for posting.

8. The remaining officers and quartermaster were posted from the "pool."

9. The officer i/c records made the necessary appointments and posting of other ranks.

10. The rest of the work, which was by far the greatest portion, was done by the D.D.V.S. of the command in which the unit was mobilized, with the assistance of the officers of the unit.

11. When the unit was reported complete and ready to move, a return, showing strength in officers, other ranks, animals, and

vehicles, with weight of stores, was sent to the Director of Movements, who arranged for transportation. For shipping purposes, the weight of veterinary stores, owing to their bulky nature, was taken as double the avoirdupois weight.

So long as no detail was overlooked in the preliminary arrangements, and so long as all concerned worked harmoniously together, no serious difficulties were encountered, and, so far as can be recalled, no untoward delay that occurred was ever due to the Army Veterinary Service.

It occasionally happened that a veterinary unit was sent overseas as a cadre with its equipment, and afterwards completed by means of drafts. This was done when accommodation for the unit at its full strength was not immediately available at its overseas destination.

It was sometimes expedient to mobilize units entirely in a theatre of war. For example, the camel hospitals in Egypt were so formed, and also the veterinary evacuating stations and convalescent depots in France.

CHAPTER II.

THE DEPOT, ARMY VETERINARY CORPS.

PRIOR to the war the command of the depot was combined with that of the Station Veterinary Hospital at Woolwich, and this arrangement was maintained for a long time during the war. It was an arrangement that led to many difficulties, and could only be justified on the ground of economy.

The experience of actual working made it evident that steps ought to be taken on or before mobilization to place the depot and the Station Veterinary Hospital under separate commands, and to appoint an adjutant and a quartermaster to the former.

The number of reservists and recruits which had to be dealt with at the depot on mobilization involved large and rapid expansion in its accommodation and arrangements for clothing, etc., and these important affairs clashed with the simultaneous and great increase of veterinary duties occasioned by the concentration of animals and evacuation of casualties to the veterinary hospital.

It was fortunate that the reservists (chiefly cavalry reservists allotted to the corps on mobilization) were posted, on first joining, to units other than the depot, because the resources of the latter would have been overtaxed if it had been necessary to deal with this personnel at the depot in addition to recruits.

The changes in the appointment of commanding officer, the absence of an adjutant or quartermaster, and the difficulty of retaining a permanent staff for the depot, were serious difficulties which were only overcome by the intense efforts of the small depot staff, who worked literally night and day until matters were placed upon a safe footing.

Merely because of the need for historical accuracy in recording adverse circumstances, with a view to their avoidance on a future occasion, the following account is given of some of the difficulties that arose :—

Staff of the Depot.

This was inadequate : it consisted only of :—

- 1 commanding officer (also O.C., Station Veterinary Hospital)
- 1 warrant officer.
- 1 staff-serjeant.
- 2 privates.

This small establishment was suddenly called upon to deal with 500 recruits

Mobilization Orders.

The original mobilization orders for the moves of mobile veterinary sections were not received until August 9th owing to delay in their transmission.

Kits.

The kits for Section D reservists were not stored at the depot prior to mobilization, which caused much confusion and delay.

Documents.

Army Book 64 (Soldiers' Pay Book) had been filled in by the officer i/c records before mobilization; this should not have been done until the reservists arrived, because the necessary particulars of allotment of pay, separation allowances, and compulsory stoppages, could have been obtained more accurately from the men on the spot.

Some men arrived from Aldershot and Bulford without having signed Army Form D.442 (Return of Reservists who rejoin on Mobilization), or the "single" or "married" declaration before leaving their stations.

Promotions and Appointments.

A copy of promotions and appointments of men to complete war establishments should have been prepared by the officer i/c records, and sent to the depot before mobilization for promulgation in Corps Orders, in order that there might be sufficient N.C.Os. to carry out the emergency duties.

Moves of Personnel.

In the rush of mobilization, moves were sometimes injudiciously arranged by the officer i/c records. For instance, orders were issued simultaneously for moves of men from the Curragh to Woolwich and *vice versa*.

Stock of Peace Clothing and Issues.

There were not enough S.D. clothing and boots in stock on mobilization to meet ordinary requirements. It was discovered too late that as many as thirty pairs of boots required to be replaced or repaired.

The inference is that when war appears imminent, care should be taken to ensure that two pairs of boots in good condition should be in the possession of every serving soldier.

When issuing clothing to Section D reservists it was found that the measurements recorded on their documents were those taken from the duplicate attestations on enlistment. They should of course have been taken from re-measurements at the time of transfer to the Army Reserve, as many changes had occurred in dimensions with consequent confusion and delay in fitting the men on joining.

System of dealing with Recruits on arrival.

There was no system laid down for guidance.

Cook-house.

The facilities for cooking were those which just sufficed for the purposes of the depot and veterinary hospital in peace. They were utterly inadequate on mobilization. The confusion and clamour of hungry recruits, which resulted, demonstrated unpleasantly the necessity of including in mobilization arrangements provision for extra cook-house accommodation for war emergency.

Farriery Staff and Horseshoes.

This was a difficulty which concerned the veterinary hospital side of the dual command.

No farriery staff (except the farrier quartermaster-serjeant of the veterinary hospital) was arranged for before mobilization to shoe animals at once; consequently some time elapsed before sufficient numbers of shoeing-smiths were recruited to carry on the shoeing of the large numbers of animals passing through the veterinary hospital as well as those posted to complete the establishments of mobile veterinary sections. The stock of horseshoes was also inadequate.

Veterinary accommodation for Sick Animals.

No arrangements were made prior to mobilization for temporary sick lines to deal with the overflow from the veterinary hospital.

It was not understood that units had permission to use their mobilization veterinary stores on the first day of mobilization for the treatment of minor cases.

Formation of Veterinary Units.

The importance of placing officers and other ranks selected for veterinary units on mobilization at once under canvas was not at first appreciated. It was found that this concentration of the unit was necessary to enable commanding officers to assume responsibility and get to know their men.

Roll Call.

Experience alone showed the necessity of calling the roll of all N.C.Os. and men at least twice daily to discover absentees.

Part II Orders.

Experience proved that the importance of Part II of Orders cannot be overestimated in order to keep a correct record of all casualties.

Changing of Commanding Officers of the Depot.

The unavoidable changes of the commanding officers at the depot led to considerable difficulty in the administration. The inclusion of an adjutant in the staff would have helped to ensure the continuity of policy which is so essential in times of emergency.

Examination of Remounts.

The officer commanding the depot was called upon to detail veterinary officers to accompany remount purchasers, which added to his duties at a time when he had already too much to do.

This was one of the chief difficulties that were encountered and overcome in the early days of the war by a staff of officers and other ranks to whom almost everything that happened was a new experience. Under the command of Lieut.-Colonel E. Brown, A.V.C., who was brought back from France on February 26th, 1915, to fill this appointment, the depot made rapid strides towards an efficiency which was maintained, under his painstaking control, throughout and after the war.

The demands for personnel for duty with the expeditionary force were necessarily given priority, and it was not until October, 1914, upon the return from South Africa of two sections, A.V.C., that it was possible to obtain an increased staff of experienced N.C.Os. for the depot. This shortage was met, as far as possible, by selecting men from among the specially-enlisted recruits for some of the appointments. The selections were not easily made because only a very small proportion of the recruits had previous military training.

With few exceptions, all recruits were posted, on first joining, to the depot, where their suitability or otherwise for the specialist duties of the corps was determined. On account of the large numbers of men to be dealt with, their examination for this purpose was of a hurried nature, but it was found to be a necessary procedure.

A considerable proportion of these men were found to be unsuited for the duties required of them, and their discharge had to be carried out by the staff of the depot.

Those accepted recruits who were considered fit to hold non-commissioned rank were put through short courses of training and placed at the disposal of the officer i/c records to assist him in completing the establishments of new veterinary units being mobilized for service overseas. Special courses of instruction were arranged for the training of men selected to fill appointments as serjeants A.V.C. attached to field units.

The establishment of the depot was increased in 1915 to:—

Major	1	Staff-serjeants	4
Captain	1	Serjeants	4
Quartermaster	1	Corporals	10
Warrant officer	1	Privates	20

Total: 3 officers and 39 other ranks.

In 1918 the establishment was increased to 4 officers and 103 other ranks:—

Lieut.-Colonel	1	Staff-serjeants	5
Adjutant	1	Serjeants	8
Captain	1	Corporals	18
Quartermaster	1	Privates	71
Warrant officer	1		

This establishment of the depot also provided for the following N.C.Os. and men under training :—

Serjeants, 15 ; Corporals, 2 ; Privates, 541 ; Total, 558.

In authorizing the above establishment it was provided that if the number of men under training fell below 400 the staff should be reduced by :—

Staff-serjeants	1	Corporals.. ..	2
Serjeants.. ..	1	Privates	2

The transfer of the Territorial Force A.V.C. to the regular A.V.C. on December 1st, 1916, necessitated the addition to the establishment of the regular depot of a staff to deal with T.F. matters. This staff, which is included in the 1918 establishment shown above, comprised :—

Officers, 1 ; Staff-serjeants, 1 ; Serjeants, 2.

CHAPTER III.

PROVISION AND TRAINING OF PERSONNEL.

THE question of provision of personnel is so closely associated with and dependent upon establishments that some reference should first be made to the latter.

When mobilization was ordered in August, 1914, the only requirements in A.V.C. personnel that were definitely known were those necessary to complete the war establishment of the British Expeditionary Force and to carry on the duties of home units with the aid of civilian veterinary practitioners and civilian subordinate personnel. It was just possible to meet these requirements.

The war establishment of the original B.E.F., though relatively generous in officers A.V.C., was somewhat meagre in other-rank personnel. Originally an infantry division was allowed 11 officers A.V.C.; by the end of the war this number had been reduced to 5. Similarly, the 16 officers A.V.C. sanctioned for a cavalry division were reduced to 12.

The strength in A.V.C. personnel of a veterinary hospital for 250 patients in August, 1914, was 2 officers and 113 other ranks. The final strength in personnel of a veterinary hospital for 2,000 patients was 7 officers (including the quartermaster) and 613 other ranks.

The strength of a mobile veterinary section in August, 1914 was 1 officer and 10 other ranks. At the end of the war it was 1 officer and 18 other ranks for the sections with infantry divisions, and 1 officer and 24 other ranks for those with cavalry brigades. It is interesting to reflect that the original veterinary hospital for 250 patients became the basis of organization of all subsequent war establishments of veterinary hospitals.

The first important change was to an establishment for 1,000 patients, next to 1,250 patients, then to 1,500 patients, and finally to 2,000 patients. The ultimate organization was that of a hospital for 2,000 patients, capable of partition into 8 subdivisions, each organized to deal with 250 patients.

The principle of subdivision for war is ideal, as expansion or reduction by subdivisions is possible without affecting the efficiency of the unit.

In addition to the original veterinary units, the following came into being during the war:—

- (1) Camel Hospitals.
- (2) Camel Mobile Veterinary Sections.
- (3) Field Veterinary Detachments (Egypt).
- (4) Convalescent Horse Depots.
- (5) Veterinary Evacuating Stations.
- (6) Carcass Economiser Detachments.
- (7) Army Schools of Farriery.
- (8) Veterinary Bacteriological Laboratories.
- (9) Reserve Veterinary Hospitals, each for 1,000 patients.

The approximate distribution of veterinary units in the United Kingdom and with the Expeditionary Forces in the spring of the year 1917 was as follows :—

France.

Mobile Veterinary Sections (Regulars).

No. 1	1st Cavalry Division.	No. 29	17th Division.
" 2	1st Division.	" 30	18th "
" 3	2nd "	" 31	19th "
" 4	4th "	" 32	20th "
" 5	5th "	" 33	21st "
" 6	6th "	" 35	23rd "
" 7	2nd Cavalry Division.	" 36	24th "
" 8		" 37	25th "
" 9		" 39	1st Cavalry Division.
" 10	1st " "	" 40	30th Division.
" 11	3rd Division.	" 41	31st "
" 12	7th "	" 42	32nd "
" 13	3rd Cavalry Division.	" 43	33rd "
" 14		" 44	34th "
" 15		" 45	35th "
" 18	8th Division.	" 46	Guards' Division.
" 20	29th " "	" 47	16th Division.
" 21	3rd Cavalry Division.	" 48	36th "
" 22	9th Division.	" 49	38th "
" 23	11th "	" 50	39th "
" 26	12th "	" 51	40th "
" 27	14th "	" 52	41st "
" 28	15th "	" 53	63rd Royal Naval Division.
	37th "		

Indian Mobile Veterinary Sections.

Mhow	} 1st Indian Cavalry Division.	Ambala	} 2nd Indian Cavalry Division.
Sialkote		Secunderabad	
Lucknow		Meerut	

Canadian Mobile Veterinary Sections.

M.V.S.	..	1st Canadian Division.
"	..	2nd " "
"	..	3rd " "
"	..	4th " "
"	..	" A " Canadian Cavalry Brigade.

Australian Mobile Veterinary Sections.

No. 1	..	1st Australian Division.
" 2	..	2nd " "
" 3	..	3rd " "
" 4	..	4th " "
" 5	..	5th " "

New Zealand Mobile Veterinary Section.

No. 1.

Mobile Veterinary Sections (Territorial Force).

1/1st Highland	..	51st Highland Division.
1/1st West Lancs.	..	55th (West Lancs.) Division.
2/1st " "	..	57th " "
1/1st Northumbrian	..	50th Northumbrian Division.
1/1st North Midland	..	46th North Midland Division.
1/1st South	..	48th South " "
2/1st " "	..	61st " " "

Mobile Veterinary Sections (Territorial Force)—continued.

1/1st London	..	56th London Division.
1/2nd "	..	47th " "
2/2nd "	..	60th " "
1/1st West Riding	..	49th (West Riding) Division.

Veterinary Hospitals.

No. 1	La Chapelle-aux-Pots.	No. 10	} Neufchatel.
" 2	Havre.	" 12	
" 3	Boulogne.	" 13	
" 4	Calais.	" 14	Abbeville.
" 5	Abbeville.	" 19	Rouen.
" 6	Rouen.	" 22	Abbeville.
" 7	} Forges-les-Eaux.	" 23	St. Omer.
" 8		" 24	Gournay-en-Bray.
" 9	Dieppe.		
	Canadian	..	Havre.
	Indian	..	Marseilles.
	Indian	..	Rouen.
	Australian	..	Coquelles.

Schools of Farriery.

One at Abbeville.

Convalescent Horse Depots.

No. 1	..	Gournay.
" 2	..	Dannes.

Base Depot of Veterinary Stores.

No. 1	..	Havre.
" 2	..	Calais.

Advanced Depots of Veterinary Stores.

No. 1	Attached to No. 5 Veterinary Hospital.		
" 2	"	" 7	" "
" 3	"	" 2	Base Depot Veterinary Stores.

Base Records.

No. 1	..	Rouen.
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Egypt.

Mobile Veterinary Sections (Regulars).

No. 19	..	42nd Division.
" 54	..	Special Establishment.
" 55	..	" "

Australian Mobile Veterinary Sections.

M.V.S.	4th Australian Division.
"	5th " "
"	No. 6 Australian Anzac Mounted Division.
"	" 7 " " " "
"	" 8 " " " "
"	" 2 N.Z. " " " "

VETERINARY HISTORY OF THE WAR.

Mobile Veterinary Sections (T.F.).

3/1st Highland	..	Mounted Brigades.
1/1st Welsh	..	53rd Welsh Division.
3/1st North Midland	..	Western Frontier Force.
4/1st " "	..	6th Mounted Brigade.
3/1st South "	..	5th " "
4/1st " "	..	Western Frontier Force.
1/1st East Anglian	..	54th Division.
1/1st Lowland	..	52nd Lowland Division.

Veterinary Hospitals.

No. 11	..	Quesna.	No. 21	..	Bilbeis.
" 16	..	Heliopolis.	" 26	..	Alexandria.
" 20	..	Abbassieh.			

Camel Hospitals.

No. 1	..	Zeitoun.	No. 2	..	Ismailia.
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Convalescent Horse Depots.

No. 1	..	Maadi.
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Base Depots of Veterinary Stores.

No. 3	..	Alexandria.
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Base Records.

No. 2	..	Alexandria.
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*Salonika.**Mobile Veterinary Sections (Regulars).*

No. 16	..	27th Division.
" 17	..	28th "
" 25	..	10th "
" 34	..	22nd "
" 38	..	26th "

Mobile Veterinary Sections (T.F.).

3/2nd London	..	7th Mounted Brigade.
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Veterinary Hospitals.

No. 15.
" 17.
" 18.

Base Depots of Veterinary Stores.

No. 4.

Base Records.

No. 3.

*Mesopotamia**Mobile Veterinary Sections (Regulars).*

No. 24	..	13th Division.
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Indian Mobile Veterinary Sections.

M.V.S.	..	3rd Division.
"	..	7th "
"	..	14th "
"	..	15th "
"	..	6th Cavalry Brigade.

Base Depots of Veterinary Stores.

Indian	..	Basra.
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British East Africa.

Base Depots of Veterinary Stores.

No. 5	..	Mombassa.
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Home Commands.

ALDERSHOT.

Veterinary Hospitals.

No. 2 Reserve	..	Aldershot.
" 3	"	"

Army Veterinary School.

One at Aldershot.

Schools of Farriery.

One at Aldershot.

EASTERN.

Mobile Veterinary Sections (Territorial Force).

2/1st Highland	..	64th Highland Division.
2/1st Lowland	..	65th Lowland
1/1st East Lancs.	..	66th East Lancs. Division.
2/1st East Anglian	..	69th East Anglian "
1/1st Home Counties	..	67th Home Counties "
2/1st West Riding	..	62nd (West Riding) "
4/1st Welsh	..	68th Welsh Division.

Veterinary Hospitals.

No. 1 Reserve	..	Woolwich	Headquarters.
Station Veterinary Hospital	..	Datchet	} Detachments.
" " "	..	Brighton	
" " "	..	Norwich	
" " "	..	Canterbury	
" " "	..	Chatham	
" " "	..	Colchester	
" " "	..	Dover	

Divisional Veterinary Hospitals.

Highland	..	Bedford.	South Midland	Leamington.
2nd London	..	St. Albans.	1st London	Tunbridge Wells.
North Midland	..	Luton.	Home Counties	Aylesford.
Welsh	..	Round Green, Luton.	West Lancs.	Hounslow.
East Anglian	..	Huntingdon.		

Schools of Farriery.

One at Woolwich.

VETERINARY HISTORY OF THE WAR.

IRISH.

Mobile Veterinary Sections (Territorial Force).

2/1st North Midland .. 59th (North Midland) Division.

Veterinary Hospitals.

No. 5 Reserve .. Curragh.

Veterinary Hospital .. Arbour Hill, Dublin.

LONDON DISTRICT.

Veterinary Hospitals.

Veterinary Hospital .. Kensington.

NORTHERN.

Veterinary Hospitals.

No. 8 Reserve .. York.

Veterinary Hospital .. Ripon.

Divisional Veterinary Hospitals.

Northumbrian .. Newcastle.

West Riding .. Doncaster.

SOUTHERN.

Veterinary Hospitals.

No. 4 Reserve ..	Bulford.	Veterinary Hospital	Larkhill.
" 6 ..	Winchester.	" "	Shirehampton.
Veterinary Hospital	Romsey.	" "	Tidworth.
" "	Swaythling.		

Schools of Farriery.

One at Romsey.

SCOTTISH.

Divisional Veterinary Hospitals.

Lowland .. Stirling.

WESTERN.

Veterinary Hospitals.

No. 7 Reserve .. Ormskirk.

Divisional Veterinary Hospitals.

East Lancs. .. Ormskirk.

In the early days of the war, the subordinate personnel (and to some extent the officer personnel) of veterinary hospitals in the United Kingdom was chiefly composed of civilians, and it was found possible to replace this civilian element by military personnel only after the war was well advanced.

At first the veterinary hospitals had to be worked by such means and with such personnel as were available, and had no definite establishment. Gradually, however, they were regulated to correspond, as far as possible, with the establishments laid down for regular and T.F. veterinary hospitals.

The principle of expansion or reduction by subdivisions for 250 patients was constantly practised in the United Kingdom according to the distribution of troops and the ebb and flow of the animal sick rate. By this means there was effected a financial saving which it would have been difficult to effect without some similarly elastic organization.

Provision of Officer Personnel.

The following numbers of officers, A.V.C., were holding commissions on the outbreak of war:—

Regular Officers	169
Reserve of Officers	19
Special Reserve	28
Territorial Force	148
Total ..	364
	(including two Quartermasters).

The requirements of the Expeditionary Force on mobilization were 192 officers.

Of the 169 regular officers, no less than 64 were serving in India, and 32 in oversea colonies and the Egyptian Army.

The officers of the Territorial Force were not available for duty with the Regular Army formations of the original Expeditionary Force.

Of the 28 officers of the Special Reserve, several were holding appointments in the colonies and thus were not immediately available.

There was, consequently, a considerable deficiency in the number of officers required, and this was made good by granting temporary commissions to civilian practitioners who volunteered their services.

Regular temporary commissions were given in accordance with the terms of a contract (similar to that used in the South African War), wherein the candidate undertook to serve for one year or the duration of the war with the rank and pay of a lieutenant, A.V.C., and a bonus of 60 days' pay for each year or subsequent part of a year of service. The contract was afterwards altered to provide for the rank of captain being given after 12 months' satisfactory service. This plan of engagement, however, gave rise to many difficulties. The need for officers, A.V.C., was for a long time very great, and recourse was had to every means by which the eligible practitioner might be induced to offer his services. The following measures were taken:—

- (1) The age limit for temporary commissions in the Army Veterinary Corps was raised to 50 years.
- (2) Standing advertisements were inserted in the professional weekly journals.
- (3) The co-operation was obtained of the President of the Royal College of Veterinary Surgeons, the Principals of the Veterinary Schools, and other prominent members of the profession.

- (4) Personal appeals were made to every eligible practitioner.
- (5) The powers of the Military Service Acts were invoked in some instances.

The difficulties that arose in the working of the Military Service Acts in regard to civil veterinary practitioners were considerable, and caused much inconvenience to individuals without, in many cases, producing satisfactory results. It was ultimately decided, in agreement with the Local Government Board, the Secretary for Scotland, and the Council of the Royal College of Veterinary Surgeons, to form a Special Veterinary Tribunal (with a panel in Scotland) to be composed of twelve members of the veterinary profession. The members of the Tribunal were selected from twenty names, of which twelve were those of members of the Council of the R.C.V.S., and eight those of veterinary practitioners outside the Council.

The Tribunal came into being on August 28th, 1918, and entered upon its duties immediately, with the result that the difficulties which led to its creation disappeared.

The following memorandum, dated July 1st, 1918, sets forth clearly the reasons which necessitated the formation of the Tribunal:—

“Supply of Veterinary Surgeons for the Army.

“The present situation with regard to the supply of duly qualified veterinary surgeons to meet the requirements of the Army Veterinary Service is as follows:—

“There are on the Register of Veterinary Surgeons at date July 1st, 1918, 3,350 members, of whom at least 350 are in practice outside the United Kingdom.

There are thus in the U.K.	3,000
Of these, members over 60 years of age number	240
Members practising other professions	12
Practising in Ireland	343
Total in round figures	600
	<hr/>
	2,400
The Army Veterinary Service employs in either a civil or a military capacity	1,200
	<hr/>
Leaving in practice in Great Britain	1,200
	<hr/>

“Of these, it is estimated that one-tenth are under forty years.

“So large a proportion of veterinary surgeons has already been taken away from civil practice that it has now become a matter of extreme difficulty equitably to decide on the relative claims of the War Office and of civil practice on the services of any veterinary surgeon.

"During the past four years, the Council of the Royal College of Veterinary Surgeons has used every means in its power in the endeavour to secure the services of as many qualified men as possible for the A.V.S. Without further powers it feels itself incapable of suggesting ways and means to meet the still urgent need for veterinary officers fit for service overseas.

"Owing to the enlistment of veterinary students, and to the effect of the Proclamations of April 20th and June 4th in calling up all students in the schools between the ages of 18 and 23 above Grade iii, the supply of new graduates is fast diminishing almost to vanishing point. On the other hand, there are still in active practice in Great Britain—apart from Ireland—at least 120 young men who are at present exempted from military service by Local Tribunals on the ground of the national importance of their work. It has been impressed upon the Tribunals, with much truth, that no substitutes can be found. There are, however, a number of veterinary officers now serving overseas who are considerably over military age, and who require to be relieved from the strain of military duty. These could, if so relieved, act as substitutes for the younger men now exempted, but it is obvious that the equitable carrying out of such substitution could only be performed by one central Tribunal.

"It is therefore suggested that the Local Government Board, in pursuance of the powers given to it by the Military Service Acts, 1916-1918, and under the provisions of the Military Service Regulations, 1918 (R.185), Part III, Sec. 54, should appoint a special Tribunal to deal with all applications for the grant, renewal, or review, of certificates of exemption to veterinary surgeons in Great Britain.

"The Special Tribunal, to be called the Veterinary Tribunal, should consist of such number of members representative of the veterinary profession as the Director-General of National Service may from time to time appoint.

"As the Royal College of Veterinary Surgeons is the only body empowered by Act of Parliament and Royal Charter to deal with the education, examination, and registration of veterinary surgeons in the United Kingdom, and as the Council of the College is elected from year to year by the votes of the members of the College who constitute the veterinary profession, it is suggested that a panel of ten members of the Council, appointed *ad hoc*, would form a representative veterinary tribunal. Representatives of any Government Departments concerned should also have seats on the Tribunal.

"The Veterinary Tribunal should have similar powers and duties as are prescribed for other special professional tribunals.

"It should be empowered to grant certificates on occupational grounds, but only on condition that the veterinary surgeon shall undertake such professional service and under such conditions as the Director-General of National Service may,

after consultation with the Veterinary Tribunal, and in concert with any Government Department concerned, from time to time deem best in the national interests.

"The Veterinary Tribunal should also have the power to require from the Army Veterinary Department from time to time a list of such officers now serving overseas as may be available for release from military duty. It should be the duty of the tribunal to make arrangements for the substitution of such released officers in the place of any veterinary surgeon whose certificate of exemption may be withdrawn, in cases where this may appear to be necessary."

In addition to engagements of veterinary practitioners in the United Kingdom, it was found necessary, for the purposes of supplying the needs of the New Armies, to appeal through official channels to the Overseas Dominions to send home, for temporary commissions in the A.V.C., eligible candidates having British, Canadian or Australian veterinary degrees. The number of officers obtained from these sources was 182, the majority of whom were Canadian graduates.

Several practitioners governmentally employed in Crown Colonies resigned their appointments or were temporarily released by the authorities concerned for general service. The Board of Agriculture released fifteen officers.

The total number of officers, A.V.C., on November 11th, 1918, was 1,356.

In September, 1914, the Remount Department asked the Veterinary Service for a number of veterinary practitioners for a British Remount Commission, which was proceeding to North America and Canada to buy horses, and for the veterinary care of animals on board the ships which were to convey them to the United Kingdom. Veterinary practitioners were engaged on a form of civil contract.

For each ship a civilian veterinary practitioner and an assistant were engaged and sent overseas to conduct the horses back.

The veterinary practitioners received pay at the rate of £250 a year, with a bonus on a sliding scale (according to the percentage of deaths) for horses landed in good condition. The assistant received 10s. a day.

The Remount Department also required the services of many civil practitioners for examining horses on purchase in the United Kingdom. They were paid at the rate of £2 a day.

Other civilian practitioners were engaged locally, and generally, for executive work with veterinary hospitals and regimental units, with pay, as a rule, at £1 a day, or at $\frac{1}{2}$ d. a day per horse according to circumstances.

With the exception of the requirements of the British Remount Commissions and horse-ships, for which engagements were made at the War Office, veterinary practitioners for employment in a civil capacity were engaged by the Veterinary Directorates of Commands in accordance with the form laid down.

The urgent requirements of the expeditionary forces and units mobilizing in the United Kingdom precluded the possibility of training fully in corps duties the newly commissioned officers before they went overseas. Every effort, however, was made to impart instruction when time and circumstances permitted. With this in view the officers on first joining were, as a rule, posted to the veterinary hospitals at Aldershot and Woolwich, which were the most convenient centres for training. At Aldershot, especially, an intensive system of instruction was practised, which did much to help the individual officers and increase their usefulness to the corps.

Many of the veterinary practitioners who were subsequently given commissions had already served in a civil technical capacity with veterinary hospitals and mounted units, and had consequently more or less knowledge of military procedure.

Among the recently qualified practitioners who were given temporary commissions immediately they graduated, were some who had already received military training in Officers Training Corps and Cadet Corps. Towards the end of the war some of these recent graduates were men who were in the third or fourth year of veterinary studies at the outbreak of war, and who had enlisted in combatant units. By arrangement with the military authorities and the Council of the Royal College of Veterinary Surgeons, they had been permitted to return to the Veterinary Schools to complete their studies. Some had held commissioned rank, and all had gained valuable military experience.

A.V.C. Officer Statistics.

1. Number of officers who on the 4th August, 1914, held Commissions in the Regular Army, Special Reserve and T.F. respectively.	Regulars ..	168 and 1 Qr.-Mr.
	S. Reserve ..	28
	T.F. ..	148
	R. of O. ..	18 and 1 Qr.-Mr.
		<hr/>
		362 2
2. Numbers who received Commissions since 4th August, 1914, giving separately those of the Regulars, S.R., T.F., and T.C.	Regulars ..	4
	S.R. ..	84
	T.F. ..	173
	T.C. ..	945
	Qr.-Mrs. ..	71
	Honorary ..	29
		<hr/>
		1,306
3. For each of the above classes, the number of killed, wounded, missing, prisoners, died, etc. .. See Table A.		
4. The number of officers of the T.F., S.R. and T.C., since August 4th, 1914, who have since been transferred to the Regulars.	S. Reserve ..	32
	T.F. ..	6
	T.C. ..	32
	Direct Coms. ..	3
		<hr/>
		73

TABLE A.—*Officers, A.V.C.*
 Number killed, wounded, died of wounds, prisoners, missing, etc

	Killed in Action.	Died of Wounds.	Wounded.	Died of Disease.	Killed accidentally or died from accidental injuries.	Drowned.	Gas Poison but not fatal.	S.I. Suicide.	Prisoners.	Missing.	Total.
Regulars ..	2	2	2	4	1	—	—	—	1	—	12
S. Reserve ..	—	2	6	1	1	—	—	1	—	—	11
T. Force ..	1	—	8	9	1	—	—	—	—	—	19
T. Commissions	1	6	9	17	5	2	1	5	—	—	46
Quartermasters	—	1	—	—	—	1	—	—	—	—	2
Totals ..	4	11	25	31	8	3	1	6	1	—	90

Provision of Quartermasters.

With the increase in size of a veterinary hospital to an establishment for 1,000 patients, the need for quartermasters became imperative. Accordingly, sanction was sought and obtained for the appointment of honorary lieutenants and quartermasters for inclusion in the establishment of each veterinary hospital for 1,000 cases, or over, with the expeditionary forces and at home. The condition, however, was imposed that appointments were not to be made from serving warrant officers and N.C.Os., so that it was necessary to pass over the claims of highly competent warrant officers and N.C.Os. serving in the A.V.C., unless they were qualified for, and willing to be retired to, pension. The appointments, therefore, for the most part, had to be made from ex-warrant officers and N.C.Os. of other arms who had already taken their discharge. The number of eligible candidates was limited because, by the time sanction was obtained for the appointments, most of those who would have been eligible had been given appointments in other branches of the Service. The requisite numbers, however, were at last obtained. A very few of the regular A.V.C. personnel who were eligible elected to be discharged to pension in order to be appointed.

Subsequently, sanction was also obtained for the inclusion of a quartermaster in each of the following units:—

A Convalescent Horse Depot.

A School of Farriery.

The Depot at Woolwich.

The appointment of officer i/c Base Depot of Veterinary Stores was filled by a quartermaster.

There is no doubt that the policy of utilizing quartermasters instead of technical officers for non-professional duties did much to prevent the worst effects of the shortage of veterinary officers throughout the war.

Provision of Subordinate Personnel.

The total number of warrant officers, N.C.Os. and men of the Army Veterinary Corps available on August 4th, 1914, was 322.

As soon as general recruiting began the A.V.C. was included, and many transfers from other arms were carried out. Expansion at first was so rapid that the supply of personnel was for some time below the demand, but by recruitments and transfers from other arms it was possible to meet the overseas requirements throughout the war.

The estimated monthly requirements in recruits for the A.V.C. were regularly submitted to the Director of Recruiting, whose staff, as far as possible, met the demands.

The lack of accommodation at Woolwich made it impossible to deal with more than a certain number of recruits each week, and this circumstance had much to do with the shortage which occurred from time to time in the Home Commands.

The situation was met by employing, at first, civilian subordinates almost entirely in veterinary hospitals at home, and reserving the available A.V.C. personnel for the expeditionary forces and mobilizing units.

Early in the war the plan was adopted for the first time of including in the war establishments of infantry and artillery brigades, and certain other formations, serjeants, A.V.C., for first-aid veterinary duties. This arrangement was made in consequence of the shortage of officers, A.V.C. The number of the latter was not sufficient to complete the war establishments of new divisions on the scale existing in 1914, and it was considered that the difficulties arising from the necessary reduction in the establishment of officers, A.V.C., might to some extent be overcome by adding a serjeant, A.V.C., to the establishment of each infantry brigade, field artillery battery, and ammunition column. The principle had already been introduced by the inclusion of a lance-corporal, A.V.C., in the establishment of infantry brigades.

In the aggregate, the requirements for serjeants, A.V.C., trained for this duty were very considerable. An infantry division required from twelve to twenty serjeants.

Facilities did not exist, early in the war, in the United Kingdom for training all these N.C.Os., consequently much of the necessary selection and training was carried out by arrangement of the D.V.S. of the British Expeditionary Force.

Certain of the serjeants, A.V.C., trained in France were sent back to the depot, A.V.C., for posting to field units on mobilization.

The time was at last reached when, so far as subordinate personnel was concerned, the difficulties of the Army Veterinary Corps seemed at an end; but the relief was of short duration. In 1917, orders were received that the administrative services must yield up their category "A" physically fit N.C.Os. and men and receive in their stead the less fit from combatant units. N.C.Os. and men in mobile veterinary sections and serjeants, A.V.C., with field units were exempted from this arrangement, which practically meant that the work of training the remaining personnel had to begin all over again. It was remarkable how this immense task of reconstruction of establishments was accomplished while the work of these technical units was being carried out. The strain thrown on the officers was very great.

The necessary insistence by the authorities on the principle of acting-rank of warrant officers and N.C.Os. greatly added to the responsibilities and difficulties of the officer i/c records and officers commanding units. It was ruled that, when a N.C.O. of a certain rank and seniority was posted to a unit already at full strength, all N.C.Os. junior to him, who were holding acting-rank and became affected by this addition to the establishment, must step down a place in acting-rank.

Every attempt was made throughout the war by the recruiting authorities to obtain for the A.V.C., men who had experience with

horses in civil life, but the supply of these was soon exhausted, and ultimately the recruits for the most part were entirely raw in this respect.

A large proportion of the men employed in the early stages of the war as civilian subordinates in veterinary hospitals in the United Kingdom were subsequently enlisted in the A.V.C., and by virtue of their training proved most useful.

The employment of Egyptian subordinate personnel in lieu of A.V.C. other ranks in the veterinary hospitals, camel hospitals, and convalescent depots in Egypt, did much to relieve matters when the man-power question became acute. In these establishments, the European subordinate personnel was restricted to N.C.Os., the remainder being locally engaged natives. Similar arrangements were made in East Africa.

In the later stages of the war on the Western Front arrangements were made, as far as possible, to utilize, for clerical duties in veterinary L. of C. units, members of the W.A.A.C., but this was only possible to a limited extent.

The total number of warrant officers, N.C.Os. and men on the strength of the A.V.C. at its maximum was 27,950.

For the reasons already stated as regards officers, it was seldom possible in the earlier stages of the war to give much training to men before they went overseas. The depot and the veterinary hospitals did all that could be done in this respect, but it was, on the whole, very little.

The transfers of already trained soldiers from other arms, and dilution of raw recruits with a proportion of trained A.V.C. personnel, were favourable circumstances at a most difficult time.

As far as possible, fresh recruits were not sent directly overseas, but were posted to veterinary hospitals in replacement of drafts who had received some training in corps duties. This system, could, however, only be carried out to a limited extent, because it was necessary to preserve the technical efficiency of veterinary hospitals in order that the care of the animals might not suffer: constant changes of personnel on a large scale would, for this reason, have had disastrous consequences.

The Dominion contingents of the expeditionary forces provided their own A.V.C. personnel and, in respect of officers, were organized on a more generous scale than the Imperial forces.

Much assistance was given by the Indian Army in providing Indian subordinate personnel for Mesopotamia and Egypt, in addition to their divisional units and Field Veterinary Sections in France.

An acute difficulty experienced during mobilization was the shortage of trained shoeing-smiths in fighting units. In the hurry of early recruiting, little attempt was made to ensure that a farrier in civil life should be employed at his trade in the army, an oversight which, apart from being adverse to economy, led to much subsequent trouble with the Farriers' Trade Unions. The burden of putting matters right in this respect fell upon the Army Veterinary Service.

To meet the demand for shoeing-smiths, soldiers who volunteered were put through a hurried course of cold-shoeing. As much as possible of this training was carried out in veterinary hospitals and mounted combatant units, but to meet the enormous demands, it was decided also to enter into an agreement with certain officials of the National Master Farriers and Blacksmiths Association, whereby men were to be trained by the latter in six-week courses, which were carried out chiefly in London and the Northern Command.*

The results were unsatisfactory, but they were better than nothing, and the measures taken sufficed to meet the immediate strain, in spite of the fact that many of the men thus trained were afterwards lost sight of and not employed as shoeing-smiths with units.

Schools of Farriery.

As it was found impossible in the divisions of the New Armies to train sufficient farriers for all units, and the supply of men trained in civil life from among the personnel of the new units appeared to be exhausted, the Army Council decided, in 1915, to establish Schools of Farriery for the purpose of training farriers for the New Armies.

At first the training was a six weeks' course in cold-shoeing, but in 1916 it was found necessary to introduce a three months' course to train men to make and fit the shoes (hot-shoeing) in addition to the course in cold-shoeing.

The first school was opened at Aldershot in June, 1915, and during the same year two additional schools were established at Woolwich and Romsey. A fourth school was established at Abbeville in France.

The personnel of the Home schools consisted of the following :—

- 1 Commandant (Major, A.V.C.).
- 1 Adjutant and Quartermaster (Hon. Lieut. and Quartermaster, A.V.C.).
- 1 Chief Instructor.
- 1 Regimental Serjeant-major.
- 20 N.C.Os. and men, A.V.C., for employments.
- 80 Farrier Instructors.

The adjutant and chief instructor were army pensioners; the farrier-instructors were re-enlisted pensioners who were too old or medically unfit for service overseas, also selected specially enlisted shoeing-smiths.

The pensioners retained the ranks held on discharge to pension, and the selected shoeing-smiths were granted the paid acting-rank of farrier-serjeant.

Four hundred men were placed under training at each home school, each instructor being responsible for the training of five men.

* In the Northern Command much assistance in this respect was given by Mr. Jones Anstey of the Agricultural Department of Leeds University.

The training was of a progressive nature, beginning with the handling of horses and mules, the use of the various tools, the preparation of the foot, the fitting, nailing, and finishing off, of the shoes; and in the three months' course in hot-shoeing the men were taught to make service pattern shoes from bar iron.

Lectures on the elementary structure of the foot and first-aid treatment of foot injuries were given by the commandant and chief instructor.

In order to prevent injuries while being taught the method of preparing the foot and nailing on the shoe, use was made of a "dummy leg apparatus" to which a dead hoof was attached in such a manner as to simulate the handling of the live limb. By this method men obtained confidence in the preparation of the foot and nailing on the shoe, and quickly completed their training on the live foot.

The dummy leg apparatus, which was in constant use at the various schools, proved to be a valuable asset for training purposes, and the pattern devised by Captain C. Budd, A.V.C., is still in use at the School of Farriery, Aldershot.

In 1919, on reduction of establishment, the schools at Romsey and Aldershot were disbanded, and later the school at Woolwich was transferred to Aldershot, which was considered the most suitable centre should it eventually be decided to retain a School of Farriery as a permanent institution on the peace establishment.

In view of the fact that there is no other efficient means of ensuring the proper training of farriers in considerable numbers on mobilization, and also no means of training men of regular infantry battalions during peace, the retention of such a school as a permanent institution, and as a necessary cadre for expansion in war, appears to be essential.

The value of a School of Farriery in the event of future mobilization can be realized by the fact that 4,000 men were trained from December, 1915, to September, 1918, at the Woolwich school alone, and this value is likely to be even greater in the future for the following reasons:—

(a) The difficulty in obtaining recruits who have been trained as farriers in civil life will increase.

(b) The experience of other corps in the employment of artificers from civilian life has shown how necessary it is for our Army to train its own farriers.

(c) It is often difficult to induce men who have learned their trade in civilian life to adopt army methods of shoeing, which necessarily differ in some important respects from those practised in peace in connection with the shoeing of privately owned animals.

Veterinary Bacteriological Laboratories.

It was a natural consequence of the rapid progress of bacteriological science within recent years that steps were taken (as soon as it became evident that the war would be prolonged) to include

veterinary bacteriological laboratories in the war organization of the Army Veterinary Service.

A beginning was made in 1915 at Swaythling, where a small laboratory was temporarily established under Lieut.-Colonel Watkins-Pitchford for the purposes of investigation into pneumonia, which was at that time causing severe losses among heavy draught horses. (See the section on pneumonia in Chapter XXIII.)

From an economic view money could hardly have been spent to better advantage than was the relatively small sum (less than £1,000) which represented the total cost of the investigation.

The reduction in equine mortality which followed careful application of the principles established by means of this research more than repaid in a single week the entire monetary outlay.

The first army veterinary bacteriological laboratory in the field was established at Rouen in February, 1917, under the direction of Captain E. A. Watson, C.A.V.C., whom the Canadian authorities kindly permitted to be seconded for this duty. Subsequently, similar laboratories were established with the expeditionary forces in Mesopotamia and Italy. The establishments comprised one officer as bacteriologist and two or three other ranks.

In Egypt and British East Africa the existing laboratories of the civil veterinary departments did everything possible to assist the Army Veterinary Service, so that it was unnecessary to provide separate military laboratories in those theatres of war.

In Mesopotamia, where the veterinary laboratory was in close touch with the Central Medical Laboratory, work was greatly facilitated. Similarly, at Salonika* the army medical authorities lent indispensable aid to the veterinary staff employed on bacteriological work in that theatre of war. It is considered that this co-operation is the ideal organization, and that it should always be aimed at in future expeditions.

In the United Kingdom, which dealt with the great majority of animals supplied to the British Expeditionary Forces, there was not until the year 1918 any permanently established military laboratory for the purposes of general veterinary research. The Director-General on May 3rd, 1918, drew the attention of the Quartermaster-General to the necessity of having a central veterinary laboratory to which matters requiring scientific investigation could be referred, and where original research on disease and various economic questions affecting army animals could be carried out.

At that time the work was being carried on at different centres, which required co-ordinating and bringing under control. For instance, at Swaythling, Lieut.-Colonel Watkins-Pitchford was investigating pneumonia and other equine diseases; at Aldershot, Captain Minett was preparing mallein and doing laboratory work

* A complete veterinary laboratory was not provided for the expeditionary force based at Salonika, but valuable work was accomplished in that theatre, with limited equipment, by Major G. Moir, a temporarily commissioned officer of the Army Veterinary Corps.

in connection with glanders; at Woolwich, in conjunction with the entomologist of the Lister Institute, practical investigation was being made into the bionomics of lice and other skin parasites affecting horses and mules; and at various veterinary hospitals questions affecting the treatment, management, feeding and general well-being of military animals were constantly the subject of systematic enquiry.

It was felt that full value was not being obtained from all this work, owing to the disjointed and spasmodic manner in which it was then necessarily performed. It was suggested to locate the proposed Central Veterinary Laboratory at the Army Veterinary School, Aldershot, where it was not anticipated that any serious structural alteration would be required. The R.S.P.C.A. promised to supply the funds necessary to equip it on a practical basis. This proposal was sanctioned and the Central Veterinary Research Laboratory with the following establishment came into being.

Central Veterinary Research Laboratory.

(HOME).

WAR ESTABLISHMENT.

Detail.	Personnel.						Civilians.
	Officers.	Serjeants.	Corporals.	Privates.	Women.	Total.	
Commandant (Lieut.-Colonel)	1	—	—	—	—	1	—
Major	1	—	—	—	—	1	—
Captains or Subalterns	3	—	—	—	—	3	—
Curator	—	—	—	—	—	—	1
Serjeant	—	1	—	—	—	1	—
Corporal*	—	—	1	—	—	1	—
Privates*	—	—	—	3	—	3	—
Clerk	—	—	—	—	1	1	—
Laboratory attendants	—	—	—	—	5	5	—
Total ..	5	1	1	3	6	16	1

* For the care of animals in the stables attached to the laboratory.

The end of the war cut short the scope of this institution.

Had a similar establishment been in existence at the beginning of the war there is little doubt that great saving would have resulted in preventing the heavy losses that occurred in 1914-1915 from pneumonia and other diseases.

Apart from the question of providing personnel for bacteriological investigation, it was found necessary to train specially selected N.C.Os. in the routine examination of skin scrapings that formed a constant and heavy part of the duties in every veterinary hospital.

It was necessary for the proper control of mange (and to avoid

the danger of retaining under treatment in veterinary hospitals animals, otherwise fit, that were not actually infected with mange) to confirm the presence or absence of the causal parasite in all doubtful cases.

At a time when every officer was needed for technical and regimental duty it was not practicable to employ veterinary practitioners in this routine work. Consequently arrangements were made for the training of N.C.Os. in classes of twelve in a course of instruction in the microscopical appearances of the various parasites harboured by the horse, and in the technique necessary for the preparation of specimens.

Staff-Serjeant G. Linzell, a specially enlisted soldier of the A.V.C., who had made a hobby of entomology and microscopy, assisted greatly in this training.

These N.C.Os. were trained at Woolwich and were posted to veterinary hospitals for this duty.

Let nothing that is said in Chapter XXIII concerning the relative failure of vaccine therapy in the treatment of animals in the war be taken to question the value of these laboratories. Their justification, and it was a most complete justification, lay in the invaluable help that they gave in diagnosis and enquiry into the causation of disease whereby control was made possible.

The curative role of the bacteriologist is but a minor aspect of his value to a community, military or civil. His real value at present lies in determining causes and in pointing the way unerringly to their removal. It is not too much to say that, as far as animal transport is concerned, modern war could not be waged if science had not shown us how to control the epizootic and enzootic diseases of horses, mules and cattle.

CHAPTER IV.

ADMINISTRATION.

Headquarters Organization and Personnel.

THE staff of the Veterinary Directorate at the War Office on August 4th, 1914, comprised two officers, viz.:—
 The Director-General (Major-General R. Pringle);
 The Assistant Director-General (Major A. G. Todd);
 and four ex-soldier clerks.

This very small staff, which was established for the requirements of the Army Veterinary Service in time of peace, was suddenly called upon to deal with the multitudinous questions connected with mobilization and war.

By working day and night the difficulties were somehow met, but at last the need of further assistance became imperative, and on August 24th, 1914, the staff was temporarily increased by bringing in an extra officer to help the Assistant Director-General.

Owing to the urgent need for officers who had experience in corps duties to fill administrative appointments with the expeditionary force, this extra officer was changed three times between August 31st and the beginning of November, 1914, when it was finally filled by Capt. J. W. Rainey, an officer on the Reserve of Officers, who was recalled from France for this purpose.

On January 1st, 1915, he was appointed a Deputy Assistant Director-General, and a year later he became the Assistant Director-General when Major A. G. Todd was appointed Deputy Director of Veterinary Services with the Egyptian Expeditionary Force, Capt. P. D. Carey being appointed D.A.D.G.

The staff of officers was further increased on December 15th, 1914, by the appointment of a Deputy Director-General, to relieve the Director-General and to carry out some of the inspections outside the War Office.

Owing to continuous ill-health, Major-General Sir R. Pringle was compelled to relinquish the appointment of Director-General on October 11th, 1917, and Brigadier-General L. J. Blenkinsop, who was then serving as D.V.S. in India, was appointed to succeed him.

Between October 11th, 1917, and the arrival of Brigadier-General Blenkinsop from India on December 1st, 1917, the duties of the Director-General were carried on by the Deputy Director, Brigadier-General C. E. Nuthall.

On the appointment of General Blenkinsop to Director-General, Brigadier-General Nuthall left the War Office to take up the appointment of D.V.S. in India, and was succeeded by Colonel E. E. Martin as Deputy Director-General.

The appointment of D.A.D.G., Army Veterinary Service, ceased to exist on August 2nd, 1916.

It was found necessary to increase the technical officers in the Directorate towards the end of 1917, and on December 26th of that year Major-General Sir F. Smith was appointed as an additional A.D.G., Army Veterinary Service.

The rank of the Director-General remained the same throughout the war, viz., Major-General, but that of the Deputy was changed, on the departure of Brigadier-General Nuthall, to the rank of Colonel.

The rank of the Assistant Director-General, in conformity with that of the other Directorates of the War Office, was raised on February 25th, 1918, from Major to Lieut.-Colonel.

During the last year of the war, an officer of the Directorate (in common with other personnel branches of the War Office) was required daily at 5 p.m. to attend a conference at which the Director of Staff Duties presided, for the purpose of speedily disposing of questions relating to war establishments and appointments referred by the expeditionary forces.

There were of course many other conferences on all sorts of questions which had to be attended and, in addition, officers of the Directorate were required to serve on Committees and Boards concerned with animal disposal and other subjects.

These duties naturally encroached seriously on the time available for the despatch of the mass of immediate business. The work of the Directorate increased with the progress of the war, and it was found impossible to reduce the number of technical officers below the four borne on the establishment at the date of the Armistice.

Additions to the clerical staff were made from time to time as the work of the Army Veterinary Service expanded.

In consequence of the increase in personnel, it soon became necessary to find more office accommodation. The existing accommodation comprised a second-floor flat of three rooms, and what had been a small kitchen, located at 16, Victoria Street. In the summer of 1915 it fortunately became possible to acquire the premises of a tailor on the ground floor, which provided adequate accommodation for the entire clerical and typing staff. The three rooms on the second floor were thus made available for the sole use of the officers of the Directorate.

The total establishment of the Directorate reached five officers and fourteen clerks, but for the first three years of the war the number of clerks was never more than seven.

As far as these relatively small numbers permitted the duties were allotted in sections so as to avoid overlapping.

The Director-General co-ordinated and supervised the whole of the duties, and dealt personally with all questions of policy, war establishments, appointments, and outbreaks of disease, making inspections when necessary.

The Deputy Director assisted him in the last-named duty, and dealt with questions of officer personnel generally.

The Assistant Director-General dealt with war establishments, other rank personnel, engagements of officers on first joining, stores, mobilization, shipping, and disposal of animals.

These were the principal duties. Others were shared in accordance with the time at the disposal of officers, as their principal duties waxed or waned. For example, in the earlier stages of the war the personnel section was less extensive than later, whereas mobilization occupied very much more time.

It was possible, on account of the greater number of clerks, to allot *their* duties more definitely so that each could concentrate upon one or more subjects. The work of accountancy and other matters connected with veterinary stores was very great, and required for a long time the sole attention of one clerk. Similarly, many questions arising out of the sea transportation of remounts and the adjustments of pay and bonus due to conducting officers were for a considerable period almost as much as one man could manage.

The business in connection with the affairs of considerably over a thousand officers ultimately became excessive and entailed much clerical work.

A policy of decentralization alone made it possible to carry on with so small a staff. The Veterinary Services with the Expeditionary Forces, Home Commands, and the British Remount Commission were left as autonomous organizations with as little interference as possible from the Directorate. The initiative was only taken when it was certain that improvement could be effected, either for the benefit of the Service as a whole or for particular local administrations. The initiative was, for example, taken in the following matters :—

(1) Arrangements for training cold-shoers, and the formation of Army Schools of Farriery.

(2) Control of contagious disease, and the economic treatment of patients in veterinary hospitals.

This important task was greatly facilitated by the employment, on an extensive scale, of graphs. Separate graphs for every theatre of operations were prepared by one clerk, and kept up to date so that it was possible to see at a glance all the variations in the incidence of disease, mortality, and duration of cases under treatment which, without these expedients, could only be determined from prolonged examination of statistical returns.

(3) The formation of the Army Veterinary Research Laboratory.

(4) Appointments and establishments of personnel.

(5) The veterinary arrangements in the shipment and conveyance of remounts.

- (6) Questions affecting the supply of veterinary stores, and the curtailing of indents.
- (7) Questions relating to forage and rations.
- (8) Veterinary police measures.
- (9) Disposal of animals.
- (10) The preparation and publication of technical information and Army Council Instructions.
- (11) The co-ordination of statistical returns.
- (12) Regulations for the demobilization of animals.

The administration of Veterinary Services in Home Commands was by officers graded as follows :—

<i>Aldershot</i>	..	D.D.V.S. and one attached officer.
<i>London</i>	..	D.A.D.V.S.
<i>Eastern</i>	..	D.D.V.S. and A.D.V.S.
<i>Irish</i>	..	D.D.V.S., A.D.V.S., and D.A.D.V.S.
<i>Northern</i>	..	A.D.V.S.
<i>Scottish</i>	..	A.D.V.S.
<i>Southern</i>	..	D.D.V.S., A.D.V.S., and D.A.D.V.S.
<i>Western</i>	..	A.D.V.S.

In the control of disease among animals, these officers were assisted by the administrative veterinary officers of divisions that were being trained for service overseas or were retained for home service.

In the earlier stages of the war, veterinary officers were included in the embarkation staffs at ports of embarkation and disembarkation of horses and mules for duties in this connection. Ultimately, however, except at Southampton, it was found more economical and equally effective for the officer commanding the reception veterinary hospital at or near the port to carry out these duties in person or by his representative under the direction of Command Headquarters.

At an early stage of the war a Central Force was organized in the Eastern Command area for active service in the United Kingdom should invasion occur. A D.D.V.S. was appointed to this Force, but later on the special appointment was abolished, and the administration was carried on by the D.D.V.S. of the Eastern Command.

Similarly, on the reorganization of the Home Forces under Sir John French in 1916, the D.D.V.S. of the Eastern Command was earmarked to act as D.D.V.S. of the Forces in the event of active operations.

By arrangement with the Director of Veterinary Services of the Canadian Forces, who had an office in London, the veterinary administration of Canadian mounted units undergoing training in Great Britain was carried out for the most part by the veterinary directorates of the Commands concerned. Similar arrangements were made for the animals of the Canadian Forestry Corps operating chiefly in Scotland.

These arrangements were made because it was evident that the

prevention of the spread of contagious diseases among animals demanded a unity of control, and a complete supervision which could not be given to widely scattered units by a single administrative officer.

Technical Reports, Publications and "Returns."

The ideal state of war, in some respects, would be that in which there would be no need for the collection of statistical evidence by means of reports and returns.

Such a condition is, however, impracticable because organization is largely dependent upon statistical information from administrative and executive workers.

It should be the primary concern, however, of organizers to call only for essential and useful information, and to suppress their desire for that which is merely interesting. Above all things, duplication should be avoided.

Administrative heads of formations and commands received, from all units in their administration, weekly returns of sick animals, from which statistical information in the aggregate was compiled to show the total numbers of sick and the incidence of disease and injuries.

The administrative chiefs of the Veterinary Services in the theatres of war rendered to the War Office a weekly technical report which summarized their experiences and brought to notice points in which assistance was required in matters of personnel, appointments, material, and policy.

This weekly technical report, which was compiled from reports from the administrative heads of formations and veterinary hospitals, was found to be necessary for the purposes of veterinary organization, and has proved essential for the compilation of this history.

A weekly statistical return as shown in Table "A"* and a return of casualties in animals as in Table "B"† accompanied the technical report and, in conjunction with the latter, were found to provide sufficient information for the requirements of the War Office.

Column No. 8 in the return of casualties in animals was added in October, 1914, in order to show at a glance the wastage for replacement. This is the most important information given by the return because on it the estimates for the supply of remounts are based.

Experience proved that an essential feature of the returns from veterinary hospitals was a system of classification showing the length of time animals had been under treatment. Without this information it was not easy to determine the efficiency of the working of a veterinary hospital or to ensure that there should be a uniform policy as regards the length of time animals were kept under treatment before final disposal.

A return which merely states the numbers of cases in hospital, the admittances, discharges, and the nature of diseases, is interesting and may be useful, but it cannot assist an organizer whose business it is to carry out an economic policy of the kind indicated above.

* See page 43.

† " " 44.

It was found always necessary to have separate and early information of the incidence of contagious disease which had a military as well as a technical importance in so far as it affected the movement and distribution of mounted troops.

Nominal rolls of officers, showing their distribution, were regularly rendered to the War Office by Expeditionary Forces and Home Commands. This information was indispensable for purposes of appointments and postings.

Similarly, numerical returns of other-rank personnel rendered through technical channels were found to be absolutely necessary for the anticipation of establishment requirements and re-distribution of strength in this respect.

Veterinary officers of all ranks in the theatres of war were required to record their work in the official War Diary. It may fairly be stated that in practice this proved to be, in most instances, a futile labour.

It is a fact for which the War Diaries provided abundant evidence, if evidence is needed, that the gift of conveying useful information by means of routine written reports is a rare one, consequently a measure which ignores this fact is to a great extent unproductive, and some additional and more selective means should be taken to obtain information.

Such a means may be found in verbal conferences between administrative officers and their subordinates, and this expedient was, indeed, largely and successfully practised in many formations in the theatres of war.

It may not be too much to say that such a system of technical conferences should become an official feature of veterinary organization in war.

Official technical publications were issued from time to time from the administrative headquarters of Expeditionary Forces and Commands, and from the War Office, on matters that seemed to call for the general information of officers and other ranks of the Army Veterinary Corps. In this way it was sought to give to all the benefit of the experiences of a few, and there is no doubt that the measure was beneficial if only by stimulating interest in the points that were raised.

At a later stage of the war, officers, A.V.C., with the expeditionary forces were encouraged to submit, through official channels, articles of technical interest for publication in the professional journals.

After the system of publishing Army Council Instructions was introduced, advantage was taken of this means of official publication when it seemed necessary to obtain the co-operation of other branches of the Service in giving effect to veterinary measures for the control and prevention of disease.

Army Council Instructions were issued notably in connection with the following matters :—

- (1) The control of mange.

(2) Routine temperature-taking as a means of ensuring the early diagnosis of pneumonia among remounts.

(3) Arrangement to limit, as far as possible, the spread of infection from army animals to animals in private ownership.

(4) The co-ordination of the application of the mallein test.

It was found that, by thus embodying principles of technical procedure in an official publication of high authority and ready reference, important support was gained for measures to which there might otherwise be some opposition based on lack of information.

TABLE A.

*Army Veterinary Services.**Statistical Return of Animals.*

Week ending 19th April, '17

Strength 428,144.

	Number.	Grand Total.	Percentage of Field Force.
Sick in Veterinary Hospitals ..	38,330		
Sick in Convalescent Depots ..	5,590		
Sick with Field Units	11,160	55,080	12·86
Died, Destroyed, Killed and Missing in :—			
Veterinary Hospitals	2,280		
Convalescent Depots	136		
Field Units	3,468	5,884	1·37
Discharged for Duty from :—			
Veterinary Hospitals	2,329		
Convalescent Depots	370	2,699	·63
Discharged from Veterinary Hospitals to Convalescent Depots ..	840	840	·19
Cast and Sold :—			
Veterinary Hospitals	83		
Convalescent Depots	11	94	·02

H.Q.D.V.S.

Director of Veterinary Services.

TABLE B.

*Army Veterinary Services.**Return of Casualties in Horses.†*

For Week ending.....19 .

Formation.	Strength of Form- ation.	Sick with Units.	Died or Killed.	De- stroy- ed.	Miss- ing.	Trans- ferred sick to L. of C.	Total of Columns 4, 5, 6 & 7 showing wastage for re- placement.
1st Cavalry Division							
2nd " "							
3rd " "							
1st Indian Cav. Div.							
2nd " " "							
Guards Division ..							
1st Division ..							
2nd " "							
3rd " "							
4th " "							
5th " "							
6th " "							
7th " "							
8th " "							
9th " "							
10th " "							
11th " "							
12th " "							
14th " "							
15th " "							
16th " "							
17th " "							
18th " "							
19th " "							
20th " "							
etc., etc.							
Other Field Units ..							
Total from Field Units ..							
Remount Depots ..							
*Other Units L. of C.							
Grand Total ..							

* Excluding Veterinary Hospitals and Convalescent Horse Depots.

† From January, 1918, horses and mules were shown on separate returns.

Director of Veterinary Services.

CHAPTER V.

THE RECORD OFFICE, ARMY VETERINARY CORPS.

IN order fully to appreciate the conditions which existed in the A.V.C. Record Office on the outbreak of the Great War, it is necessary to know something of the conditions which were in force prior to August, 1914.

Before and during the South African War, 1899-1902, no Army Veterinary Corps existed and consequently no Record Office for other-ranks personnel was required. The Army Veterinary Department consisted only of officers whose records were kept at the Veterinary Directorate at the War Office.

In 1903 the formation of a skeleton Army Veterinary Corps was sanctioned, and in 1904 this was carried out by the transfer from other units of two warrant officers and 246 N.C.Os. and men. The Army Veterinary Corps was therefore called upon to take part in the greatest war in history after an existence in cadre of only ten years.

The records were at first kept at the office of the Director-General, Army Veterinary Service, and it was not until October, 1912, that an officer i/c A.V.C. records was appointed, with an office at Woolwich where, in addition, he performed the duties of officer i/c Army Veterinary Stores.

Before the outbreak of war no clerical establishment for the Record Office was officially sanctioned, but the services of the clerk of the Army Veterinary Stores were employed, and also those of a N.C.O. detailed from the depot, A.V.C., for a course of instruction in record and store work. This N.C.O. proved most useful on the outbreak of war.

The work in the Record Office was at that time comparatively small, as the strength of the corps was only 208 other ranks, being under establishment. The Special Reserve only numbered thirteen other ranks, while the other ranks of the Territorial Force were administered by the County Associations concerned quite independently of the A.V.C. Record Office.

It will, however, be readily understood that, although the arrangements made for carrying out clerical work during peace were, on the whole, adequate, they were not by any means designed to meet the requirements of mobilization because they were dependent upon the services of borrowed personnel who could not be retained on the outbreak of war. It actually happened, in fact, that the civilian clerk borrowed from the Army Veterinary Stores was promptly required on mobilization for his proper stores duties only, and that the N.C.O. attached from the depot was recalled and sent overseas as senior N.C.O. of the Base Depot of Veterinary Stores with the British Expeditionary Force.

On August 17th, 1914, a N.C.O. clerk of the A.V.C. was detailed for duty in the Record Office, and an A.S.C. specially enlisted clerk was obtained in October, 1914. During this period over 1,000 men were recruited into the corps; consequently this small staff was greatly overworked. Later on, authority to enlist men, suitable as clerks, in infantry regiments was obtained for all Record Offices, and the West Kent Regiment was the regiment selected to bear on its strength the record clerks of the A.V.C. Under this scheme eighteen clerks were enlisted. Eventually, however, owing to the fact that category "A" men were required with fighting units, authority was given for the direct enlistment of men in category "C" into the A.V.C. for clerks in the Record Office, and special authority was given to employ four girl typists.

The officer staff of the Record Office during the war was increased by the addition of one or more officers as required to assist the officer i/c records.

Amongst the difficulties encountered in the Record Office was the constant change of staff owing to the change of category of men from time to time; every month the men had to present themselves for re-examination, and if above category "C" were transferred to other units.

The military staff, which eventually rose to fifty-four, remained until after the Armistice, when they, with other troops, had to be demobilized. It was at this period that the greatest difficulty arose. Many of the clerks were men who, owing to wounds, had been rendered unfit for service in fighting units. These men were entitled to early demobilization, but it was realized that, if the majority of the clerical establishment was demobilized, the general demobilization of the corps would be held up. The situation was met by engaging civilian men and girls and, as soon as these were sufficiently trained, the soldiers were released.

The greatest number of civilians employed at any one period was 105 in May, 1919, and these were assisted by the military personnel of the R.A.V.C. who were awaiting demobilization. Many of the latter were subsequently engaged as civilian clerks in the office, where, with their past knowledge, their services were most useful.

Provision of accommodation was another problem to be solved, as on the outbreak of war there was only a small office for the officer in charge and another for the non-existent staff. In 1917, two buildings were erected in the stores compound suitable to accommodate forty clerks, but even then the space was exceedingly cramped. In 1918, just before the Armistice, the Royal Engineers erected two huts near the stores, and when demobilization started, the depot, R.A.V.C., handed over two more huts in order to accommodate the demobilization section. Ample accommodation was therefore obtained just in time to meet the rush, thereby greatly facilitating demobilization.

The necessity for sufficient accommodation cannot be too

strongly emphasized because, if officers and staff are cramped, work is delayed.

An outbreak of influenza in 1919 seriously interfered with the work in the office; at one time no less than half the staff were incapacitated, and clerical assistance had to be obtained from the veterinary hospitals.

The civilian establishment, as soon as demobilization was over, was considerably reduced, and from then on, as the work permitted, reductions were gradually made until a peace establishment was sanctioned.

The amount of work in the Record Office can be realised from the following figures :—

Number of other ranks in the corps in 1914 ..	208
Joined corps on mobilization (Cavalry Reservists, A.V.C. Reservists and Special Reserve) ..	726
Total number of N.C.Os. and men who served in the Corps	41,755
Transferred to combatant units	9,369
Maximum strength on any given date	27,950
1914 Stars issued	1,075
1914–1915 Stars issued	8,136
British War Medals issued	22,847
Victory Medals issued	22,632
Foreign decorations	24
Military Crosses	2
Distinguished Conduct Medals issued	16
Military Medals	73
Meritorious Service Medals	329
Mentions in Despatches	499
Plaques and Scrolls (issued to relatives of those who lost their lives)	641
King's Discharge Certificates and Silver Badges (issued to men who were discharged medically unfit)	3,883

Of the 41,755 N.C.Os. and men who joined the corps, the following is a table showing their disposal :—

Killed in action (up to November, 1918)	62
Died (up to November, 1918)	358
Died after November 11th, 1918, and before demobilization	91
Discharged medically unfit	5,482
Discharged, miscellaneous causes	3,453
Demobilized	21,619
Transfers from Corps to combatant units	9,369
Section " B " Reservists	85
Remaining in corps on April 1st, 1920	1,236
Total	41,755

In the earlier part of the war the Army Veterinary Corps, in common with other administrative services, suffered from outbreaks of recruiting at abnormal rates of pay. It was thought that, unless high rates of pay were offered, recruits with the desired technical knowledge of animals would not be attracted to the Army Veterinary Corps, and in consequence rates of pay varying from 3s. a day for horsekeepers to 6s. a day for farriers were given.

The following table shows the number enlisted at abnormal and normal rates of pay :—

Grade.	Daily Rate.	Number of men enlisted.	Period during which Enlistment took place.	
			From.	To.
Farriers	6s.	126	10- 8-14	7-10-14
Farriers	5s.	238	8-10-14	
Civil Veterinary Subordinates (Horsekeepers) ..	4s.	500	11- 8-14	22-10-14
Horsekeepers ..	3s.	3,200	23-10-14	July, 1915
Packers (Privates) ..	3s.	10	8- 8-14	12- 8-14
Saddlers	5s.	80	July, 1915	July, 1916
Normal Rates* ..	The rest of the men who joined for duty as Farriers, Saddlers and Horsekeepers.			

* Duration of War, Special Reserve and Territorial Force men.

It cannot be wondered at that these differences in rates of pay caused considerable discontent. Working alongside each other and employed on the same duties were men recruited as horsekeepers at 4s. a day and men recruited at normal rates. Not only were men enlisted at different rates of pay at different periods, but there were instances of men being enlisted at the same time in different parts of the country at varying and abnormal rates. In many veterinary hospitals privates were drawing more pay than the serjeants in charge of them. This was additionally unfortunate in that a private on 4s. a day obtained no financial advantage on promotion to serjeant, so that this important stimulus to ambition was completely lacking.

Apart from these objections, the co-existence of so many different rates of pay caused difficulty and confusion in the accounts.

During the war the following numbers of units were formed and became part of the war establishment of the A.V.C. :—

Expeditionary Forces :—

Veterinary hospitals	31
Indian veterinary hospitals	2
Camel veterinary hospitals	4
Convalescent horse depots	6
Veterinary evacuating stations	20
Mobile veterinary sections	83

Expeditionary Forces (contd.) :—

Indian mobile veterinary sections	..	..	11
Cavalry mobile veterinary sections	..	..	15
Veterinary laboratories	..	..	3
Base depots of veterinary stores	..	..	6
Advanced base depots of veterinary stores	..	..	3
Schools of farriery..	..	..	1

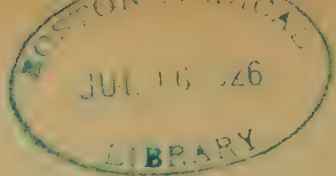
Home.

Reserve veterinary hospitals	..	..	8
Veterinary hospitals	..	..	15
Divisional veterinary hospitals	..	..	13
Schools of farriery	..	..	3

The establishments of these units varied from time to time according to circumstances and the country in which they were located.

The records of other-ranks personnel of the Territorial Force were taken over by the officer i/c records, A.V.C., in December, 1916, in order to relieve the county divisional authority and also to co-ordinate and centralize the control of the corps. The necessity of this will be easily understood as regular, specially enlisted, and Territorial Force other ranks were serving in the same units, and it was imperative to have the same system of reliefs, promotions, etc., for all. This was only practicable when control was exercised from one office.

Army Order 362 of 1918 raised the status of the Army Veterinary Corps to that of a Royal Corps, and this necessitated a change in the corps badge. The War Memorial of the corps, placed in St. George's Church at Woolwich, shows the old badge on the left of the inscription and the new on the right, whilst the banner bears the new badge.



CHAPTER VI.

VETERINARY EQUIPMENT AND STORES.

PRIOR to 1906 the stores for the Army Veterinary Service were supplied direct from contractors, but during the South African War (1899-1902) temporary arrangements were made for the reception and distribution of veterinary stores at the Red Barracks, Woolwich, with a quartermaster in charge under the senior veterinary officer of the Woolwich area.

One of the results of the South African War* was the recognition of the unsatisfactory state of the supply of veterinary stores for units during peace and war. It was conclusively proved that the system of living from hand to mouth in the matter of veterinary equipment, drugs and dressings, was not economical.

Owing to the representations of the Director-General of the Army Veterinary Service, accommodation for the reception, storage and distribution of veterinary stores and equipment was built in 1905 and handed over to the Army Veterinary Service in 1906.

The stocks of stores returned from South Africa after the South African War formed a nucleus, and in due course it was decided to build around this the complete field equipment for six regular divisions and fourteen Territorial Force divisions, together with the technical equipment for veterinary hospitals, a complete outfit for a base veterinary stores overseas, and, in addition, three months reserve in hand at Woolwich.

The store was at first controlled by the Assistant Director-General at the War Office, who was assisted by a Quartermaster, A.V.C.; later a Captain, A.V.C., was appointed officer in charge.

In October, 1912, a Lieut.-Colonel, A.V.C., was appointed officer in charge of stores and records.

The programme of completing the mobilization stores for the regular and Territorial armies occupied the period from 1907 to 1914: this entailed a considerable amount of spade work, the various articles of equipment having to be brought up to date. When this was practically accomplished, a War Office committee on "Transport in the Field" laid down a maximum weight of veterinary supplies for field units, which necessitated a re-cast of the entire scheme and re-modelling of the whole equipment.

The old reserve box was abolished, the officers' chests (originally known as the universal pattern) were wholly re-modelled, a light expandable unit chest for fighting troops took its place, and hospital chests were designed.

The unit chest (originally known as the 25 lb. chest) underwent a series of alterations with a view to improvement until, during the war, it contained the items shown in Appendix A 5. It proved a most

* Up to that time no provision had been made even for mobilization veterinary equipment.

useful and efficient chest, but owing to the enormous demands made for it during the Great War it was decided that it should be refilled and not treated as expendable ; this also became necessary on the grounds of economy, as an empty chest with containers cost before the war 4s. 8d., but eventually rose to 12s. 3½d. during the war.

Up to 1908 nothing had been done to provide the Territorial Force with equipment of any kind. In 1909 the necessary money was allotted, but it was to be spread over a period of years, 1910–13. These funds were sufficient to supply a complete up-to-date veterinary outfit for the Territorial Force, together with equipment for fourteen Territorial Force veterinary hospitals.

During 1914 the position was consolidated by adding to the stock of equipment, and improved by the introduction of compressed drugs and dressings.

A saddle-bag for Territorial Force officers had been approved in 1909, and a wallet for regular officers in 1914, which replaced the saddle-bag as the latter became worn out.

The position on the declaration of war was that all units of the field army were in possession of their equipment, while that for the Territorial Force was held at Woolwich, partly owing to the absence of accommodation elsewhere but mainly for safety.

The stores for the purposes of a base depot of veterinary stores were already packed, and a three months' reserve was in hand.

Therefore, on the outbreak of war the veterinary equipment consisted of the following :—

(a) For units of the field army : a unit chest and veterinary wallet, Mark II.

(b) For all veterinary officers : an officer's chest and an officer's veterinary wallet.

(c) For veterinary hospitals : set of hospital chests (six to a set).

(d) For overseas base store : veterinary equipment based on six months' supply for the Expeditionary Force.

(e) For reserve at Woolwich : three months' supply.

Alterations were made in the various patterns and contents from time to time.

So far as the veterinary stores were concerned, they were perfectly ready in every respect.

By the end of August, 1914, the whole of the Territorial Force units were in possession of their veterinary equipment ; a base veterinary store had been sent to Havre, and before the end of the year a second base depot had been despatched to Calais. The following base depots were subsequently established :—

No. 3 Base depot	..	..	Kantara.
„ 4 „ „	..	..	Salonika.
„ 5 „ „	..	..	Nairobi.
„ 6 „ „	..	..	Italy.

Advanced depots of veterinary stores were also formed in all war areas, and stores from the base were issued to them for re-issue

to field units. In this way the chain of organization was complete from the stores at Woolwich to units in the field.

While these arrangements were in progress, orders were issued for the replacement of the Woolwich stores on the basis of a three months' refit of equipment for the entire force. Before this could be completed, however, information was received of the formation of the New Armies, whose requirements were at once anticipated by the issue of further orders for equipment, drugs, and dressings. This enabled the divisions of the New Armies to be supplied with veterinary equipment immediately the demand was made.

During 1916 two consignments of stores to Egypt were lost at sea owing to enemy action, but were immediately replaced.

During 1917, a bacteriological laboratory was equipped and sent to Mesopotamia, and in 1918 another was sent to Italy.

The only loss of stores at sea between England and France occurred during 1918, a large consignment being sunk in the channel owing to enemy action. It was at once replaced.

Reference has already been made to the anticipation of requirements, but the circumstances of the war were such that it is desirable to place on record the method adopted to ensure that there should be no shortage.

The steps taken at the beginning of hostilities have already been related. In 1915 it was evident that the war was going to last some time and, in order to maintain stocks, requisitions on a definite basis had to be made. Every quarter, stores were requisitioned on the basis of what had been issued during the previous quarter, but during 1916 the deliveries from contractors became slower and slower; consequently, instead of a quarter's demand being made, a yearly demand once a quarter was adopted. It was a bold measure, but proved successful; it was continued to the end of the year 1917, and was the means of keeping all the theatres of war supplied as fast as issues could be made.

Never in the whole course of the war was a serious complaint made of any inability to obtain supplies from the Army Veterinary Stores at Woolwich.

In December, 1917, a careful review was made of existing stocks and demands, and the policy was then introduced of ceasing to requisition for stores and of depending as far as possible on the accumulated reserves. This scheme worked out most satisfactorily; we lived on our capital, and when the war ended in November, 1918, it was still far from exhausted.

During 1918, purchases ceased; all existing stocks were utilized; expensive drugs were debarred if not in stock; flax was substituted for silk for ligature purposes; paper tubes were employed where aluminium had been used; inordinate demands were curtailed. The result was that in 1918 a saving was effected of £69,876 as compared with the corresponding period of the previous year.

Immediately after the armistice, steps were taken to ascertain from all theatres of war the precise amount of stock on hand and

the amount which it was believed might be counted upon for return to Woolwich, only serviceable and repairable material being taken.

Owing to the inevitable loss on selling technical stores, it was decided that, as a general rule, everything should be sent home with the exception of the hundreds of tons of sulphur then held in the various theatres of war; this material was to be disposed of locally. It was well that this policy was adopted, as later on it was found that the military demands, consequent upon the reorganization of the forces of the Empire, were estimated to absorb a large proportion of the stock thus salvaged. Further, after estimating for these requirements, it was found that there was a considerable surplus which, after consultation with the Disposals Board of the Ministry of Munitions, it was decided to dispose of by giving serving and ex-officers of the corps the option of purchasing any veterinary instruments and necessities which they desired to obtain at reasonable market value. In order to facilitate these arrangements, advertisements were inserted in certain veterinary periodicals and also in the official publication "Surplus," issued by the Ministry of Munitions. By this method it was possible to dispose of surplus equipment, etc., to the value of £2,073 15s. 7d.

During the first stage of the war, i.e., from August, 1914, to the middle of 1915, there was no difficulty in obtaining drugs or instruments. After this, however, deliveries began to slow down but, as large orders were in the hands of contractors, no inconvenience was felt.

The supply of aloetic, ammonium carbonate, and chloral hydrate balls presented a real difficulty. As regards the first two, the time taken in making was considerable until a firm of contractors erected a special drying apparatus. A quick-drying process is important because each ball has to be made by hand, coated with shellac, dipped four times into gelatine, and dried between each coating of gelatine. The chloral had to be compressed into one-drachm tablets, the whole wrapped in paper and dipped in paraffin wax M.P. 135° F. All this was intricate work and occupied much time.

The Director of Contracts, in order to facilitate the delivery of stores, arranged with several firms to supply; sometimes as many as six were furnishing the same drug, dressing or instrument. In this way the supply met the demand except that of chloral hydrate balls, the issue of which had to be curtailed for about three months owing to the loss of two shipments of chloral from America which were sunk by enemy action. Similarly, the stock of vaseline at one time became very low owing to a ship carrying this article having been sunk at sea.

Aluminium tubes for holding chloral balls were, during the latter part of the war, very difficult to obtain; compressed paper tubes were substituted, and proved cheaper and most successful.

The supply of three-ply wood also became scarce, and arrangements for the supply of cardboard as a substitute for making the 25-lb. chests were being considered when the armistice was signed.

Regarding the manufacture of instruments, it was found that curved dressing scissors, folding scalpels, and aluminium measures were the most difficult to obtain. The same arrangement was made for instruments as for drugs, i.e., orders in advance and to several firms, with the result that no serious difficulty was experienced.

There was no shortage in the supply of dressings, bandages, wool, etc.: the Director of Contracts, having a large number of firms supplying these, could distribute his orders as necessary.

Officers' chests and section chests were very difficult to obtain. It took the contractors about twelve months to make and supply the last 200 chests. This was caused by the necessary seasoned wood being practically unobtainable. There was also a shortage of tin for making the trays.

The following measures were taken to secure economy :—

- (a) The issue of instructions to cut down unnecessarily large indents.
- (b) The submission of all indents from Expeditionary Forces to the War Office for approval.
- (c) Careful control over the issue of all expensive drugs.
- (d) The substitution, in the last year of the war, of cotton in place of silk for ligature purposes. Paper bandages were tried, but were not well reported upon.

Towards the end of the war the provision of containers appeared likely to give great trouble, because glass, stoneware, and metal were all equally difficult to procure: compressed paper was substituted wherever possible.

There were certain unavoidable changes during the war in the appointment of the Officer i/c Army Veterinary Stores, but fortunately it was not necessary to make any change in the appointment of the assistant officer. Lieut. and Quartermaster T. E. Campey served in the latter capacity throughout the war, and was promoted Captain, and ultimately Major, in recognition of his good work.

The personnel of the stores at the outbreak of the war consisted of :

The officer in charge.

The assistant officer in charge.

Storekeeper.

Assistant storekeeper.

One packer.

One clerk.

Two labourers.

Four privates of the corps (detailed for a six months' course).

During the war the establishment was increased by sixteen civilian labourers, in order to deal with the increase of the work, which was very considerable. For instance, 5,475,202 bandages were issued, the actual length being almost 6,221 miles, that is, the approximate distance from London to New York and back.

The handling of these stores entailed an enormous amount of labour because, when drugs and equipment are received in bulk, they have to be broken down and re-assembled in the various

articles of issue. For instance, a unit chest contains sixty-four separate items, most of which have to be weighed out and filled into the containers. This kept the staff in the stores fully employed from the date of mobilization up to the declaration of peace, and indeed for some considerable time after this, the usual number of hours a week varying from seventy to eighty hours.

One of the most difficult problems to solve was that of floor space. An annexe to the stores had to be built, as well as a store for oils and inflammable drugs.

It will be realised that, at the termination of a war of such magnitude, large accumulations of stores, equipment, and instruments remained on hand on the declaration of peace. These were dealt with, as already stated, by handing over to the Disposals Board. The value of stores thus handed over was approximately £8,204.

It was found that, owing to the conditions under which they had been stored in the field, many of the surgical instruments would be useless without overhauling and that, owing to the state of the labour market, it was impossible to get that work done by contractors. Consequently, authority was obtained for the erection of a repair workshop, where all instruments that were returned to stores could be overhauled, cast if unrepairable, and repaired and brought to stock if possible. It will be seen that the work done by the artificer in the repair workshop more than justified its erection: moreover, it enabled any instruments, etc., which were issued out for practice camps, etc., to be completely overhauled before being put back into stock. The issues and repairs carried out by the Army Veterinary Stores during the war are shown in Appendix A II.

The total cost of medicines, dressings, instruments, and field equipment, expended during the war was approximately £525,758. The war period is taken as being from August 1st, 1914 to December 31st, 1918, i.e., four years and four months. The cost is arrived at by taking:—

- (a) the pre-war cost of these articles,
- (b) the highest price at any period,

and then striking the average.

The estimated number of animals purchased during the war was approximately 1,361,000. From these figures the following table is prepared:—

	s.	d.
Total cost of medicines, dressings, instruments and field equipment per animal	7	8·71
Cost of medicines, dressings, instruments, and field equipment per year per animal	1	11·187
Cost of medicines, dressings, instruments, and field equipment per month per animal		1·932
Cost of medicines, dressings, instruments, and field equipment per day per animal		·0644

These figures do not include cost of handling, packing, transport, etc.

CHAPTER VII.

THE ROYAL SOCIETY FOR THE PREVENTION OF CRUELTY
TO ANIMALS.

WHEN war was declared, the Royal Society for the Prevention of Cruelty to Animals came forward and placed its resources in personnel and funds at the disposal of the Army Council. It gave great assistance in organizing itself as a sort of recruiting agency for its own inspectors and other men, such as grooms, who had special knowledge of horses. These men were enlisted into the Army Veterinary Corps and formed a highly trained nucleus.

On November 5th, 1914, in consideration of the national prestige of the Society, and the services it had already rendered in connection with recruiting for the Army Veterinary Corps, the Army Council formally gave its approval to the formation, as an auxiliary of the Army Veterinary Corps, of the R.S.P.C.A. Fund for sick and wounded animals, under the chairmanship of the Duke of Portland. This fund was devoted at first chiefly to the provision of stabling for veterinary hospitals in France.

In 1915, the Society allowed its chief secretary (Captain E. G. Fairholme, O.B.E.) to receive a temporary commission in the Army Veterinary Corps and to proceed to France to assist in the administrative work arising out of the supply of hospital buildings and requisites sent over by the R.S.P.C.A. from England. He was appointed D.A.D.V.S. under the Director of Veterinary Services with the British Expeditionary Force. On completion of this duty Captain Fairholme returned to the Society's office in London and occupied himself busily for the remainder of the war in collecting contributions for the fund and disposing of the money to the best advantage of the work of the Army Veterinary Service.

There were many difficulties during the later part of the war in obtaining material for hospital buildings, vehicles, etc. Permits had to be obtained for the release of essential materials, e.g., steel for motor chassis, so that the provision of one motor-driven horse ambulance involved a quantity of clerical work and personal effort, in all of which the secretarial staff of the R.S.P.C.A. greatly assisted. Up to the end of March, 1919, the Society spent nearly £200,000 in providing contributions to the material welfare of army animals.

The following is a list of the gifts to the Expeditionary Force in France alone :—

Complete building for four veterinary hospitals.

Complete buildings at No. 1 Convalescent Horse Depot.

Steel stabling for 1,000 animals at No. 2 Base Remount Depot.

Steel stabling for 250 animals each at Nos. 3, 4, 5, 10, 12 and 13 Veterinary Hospitals. (In all, stabling for 12,500 animals.)

3 motor lorries.

- 26 motor-driven horse ambulances.
- 80 horse-drawn ambulances.
- 107 horse tents.
- 4,000 manure skips.
- 1,500 body sheets.
- 27,190 bandages.
- 30 electric clipping machines with accessories.
- 18 corn crushers
- 18 chaff cutters
- 18 petrol engines
- } with spare parts.
- 2 scientific cameras with accessories.
- 47 vermores sprayers and spare parts.
- 72 poultice boots.
- 63 tin dressing boxes.
- 2 bacteriological incubators.
- 31 sterilizers.
- Bacteriological apparatus for A.V.C. Laboratory and Nos. 2, 3, 6 and 9 Veterinary Hospitals.
- 12 ovens, 4 boilers and 40 cisterns for the preparation of "hot feeds."
- 1 ton of white paint for operating theatres.
- 7 I.W.E.L. fat melters and driers.
- 7 turbine centrifugal fat extractors.
- 7 meat cutting machines.
- 3 bone crushers.
- Boiler and engine complete with all accessories for No. 4 Horse Carcass Economiser Detachment.
- 4 sets special horse ambulance harness.
- 100 bits.
- 100 manure trucks.

Gifts for A.V.C. personnel : gramophones, cricket and football outfits, boxing gloves, games, books, etc.

The Society also supplied a large number of horse ambulances and other gifts for use with veterinary hospitals in the United Kingdom, and fully equipped the Research Laboratory at the Army Veterinary School at Aldershot.

In connection with this special fund, the Commander-in-Chief of the British Army in France (Lord Haig) wrote :—

"As you are aware, animals have been exposed to very severe trials and hardships, and have suffered not only as battle casualties but through the exhaustion and loss of health consequent on the severe stress of work. Their lot has, however, been greatly lightened, and their comfort in sickness materially added to, by the assistance which the fund has been able to give. . . . I would specially like to express my thanks for the provision of motor horse ambulances, which have saved so many animals and proved indispensable adjuncts to the Veterinary Service, also of the veterinary hospitals complete with every known convenience for up-to-date surgical and medical treatment."

The value of an organized Society like the R.S.P.C.A. to the Army Veterinary Service in time of war, as measured by what was actually done in the late war, is very great. There are many kinds of material on the border line between luxuries and necessities which cannot be provided from public sources, but which are nevertheless of much assistance in the veterinary care of sick animals. Moreover, when any requirement of an unusual nature is demanded from official sources, some time must necessarily elapse before it can be obtained as financial sanction for such a purchase is only given after an adequate case has been made out. A benevolent society is perhaps in a better position to meet with less delay such a request if it is clear that prompt action will alleviate animal suffering.

Experience showed the necessity of controlling the work of the R.S.P.C.A. from the Veterinary Directorate at the War Office. Without this centralization the Society would have wasted its resources in meeting many frivolous and unnecessary demands. There were many instances of requests to the Society from veterinary and combatant officers for simple dressings and medicines that could have been as readily obtained on indent from the Army Veterinary Stores. Consequently, it became an established agreement between the chief secretary of the R.S.P.C.A. and the Veterinary Directorate of the War Office that all requests for assistance from veterinary officers should be referred to the War Office in the first instance. This procedure, which was usually carried out by telephone, caused no delay and provided a necessary safeguard.

In all this good work the Society had a rival in the Blue Cross Fund of the Dumb Friends' League. This league was animated by the same benevolent spirit as the R.S.P.C.A., but it had not the established organization and trained personnel of the latter Society, and it was chiefly for these reasons that the Army Council decided to give its official sanction only to the R.S.P.C.A. Moreover, it was not desirable that two organizations should be separately competing with each other for the collection of funds from the public, when the resources of one fund sufficed to meet all requirements.

The additional work thrown on the Veterinary Directorate at the War Office in co-ordinating the efforts of the R.S.P.C.A. was considerable at a time of high pressure, and it would not have been possible, without an increase of staff to co-ordinate the work of a competing benevolent organization.

The Dumb Friends' League accordingly continued their humane work independently, and its main fruits went to the assistance of the 'Allies. They were happy in their title of "Blue Cross," which was erroneously considered by the public as bearing the same relation to the Army Veterinary Services as the "Red Cross" bore to the Army Medical Services.

CHAPTER VIII.

ANIMAL MANAGEMENT.

AT one time animal management was looked upon as entirely separate from veterinary science, just as in the dawn of human medicine there was little recognition of the essential connection of the latter with the principles of hygiene. The old-time veterinary practitioner, like the old-time physician, regarded the problems of his profession as a collection of mysteries which could only be dealt with by subtle and mysterious means of which a layman could know nothing. Power and knowledge in all these dark matters were so fully accorded to the practitioner that it seemed beneath his professional dignity to study or practise the simple principles of animal management. There was a great gulf fixed between the learned "horse-doctor" and the ordinary "horse-master." Modern science, however, has bridged the gulf, and it is only fair to the veterinary practitioner to say that the building was projected from his side of the chasm.

Research into the nature and causation of disease made it perfectly clear that most disease processes were not of dark and mysterious origin, but were the natural effects of causes which could be prevented by taking hygienic measures or, in other words, by applying the principles of animal management. Animal management, in short, is preventive veterinary medicine. If it is not that, it is nothing. Just as human medicine logically and indisputably includes the ancillary sciences of hygiene and sanitation, so veterinary medicine includes animal management. The fundamental principles of animal management have been established and recorded only by veterinary scientists. These principles were practised during the late war on a scale proportionate to the magnitude of affairs.

Very little distinct material is available for a chapter on this important subject, because the whole of the work of the Army Veterinary Service is so inseparably bound up with it that most of the sections of this history contain references to what was done in this respect; and it is desirable to avoid repetition.

The problem of the prevention of disease, so far as this could be effected by animal management, was the first object in the military veterinary policy throughout the war. Appendix B II, which is a reprint of a departmental pamphlet circulated at an early stage of the war to all veterinary officers, provides sufficient evidence of the extraordinary importance that was attached to the matter, and of the detailed consideration which it received. It was the more necessary to concentrate upon this subject because, for the most part, the fighting personnel of the New Armies knew little or nothing about animals. Consequently, veterinary officers had to become professors as well as practitioners, to instruct as well as to act.

The widespread inexperience in animal management shown by all ranks of the New Armies in the field was the cause of so much animal wastage in France that it was considered necessary to arrange courses of instruction. Accordingly, courses lasting from ten days each were carried out in certain veterinary hospitals on the lines of communication. The class at each hospital comprised ten officers and fifty N.C.Os. The commanding officer of the veterinary hospital arranged for instruction by lectures and demonstrations on the following subjects:—

- (1) Animals in health ; signs of disease ; condition ; work ; exercise.
- (2) Stable routine ; water and watering ; food and feeding ; grazing.
- (3) Grooming ; clothing ; clipping ; winter conditions.
- (4) Picketing lines ; cover ; standings.
- (5) Saddles and harness ; sore backs and galls.
- (6) Shoeing.

The instruction was brief and elementary because of the desirability of training as many people as possible in as short a time as possible. In addition to these courses, instruction was given to classes formed in army areas by arrangement with the administrative veterinary officers of the formations concerned.

There is no doubt that some good was done by all this instruction, although experience goes to show that only persons with a definite aptitude can profit by hurried instruction in such a wide subject as the scientific management of animals. On the whole, the most valuable effect of this sort of instruction is that it inculcates a respect for scientific knowledge and implants a faith and an interest in the minds of those who pay any attention to the teachings. By this means there is eliminated that blank indifference which is the greatest obstacle met with by the executive veterinary officer in his efforts to secure the proper management and well-being of animals in his veterinary charge.

The many military horse shows that were successfully organized during the latter part of the war by the British troops in France, and, on a smaller scale, in the United Kingdom, were partly a cause and partly an effect of the ever-growing interest and pride in the welfare and quality of army horses and mules.

*During the first three years of the war, on the Western Front it was the rule as far as possible to clip all horses with field units in army areas throughout the winter. The procedure may have been a contributory factor to the heavy mortality among horses and mules in France which occurred in the spring of 1917. This occurrence was the culminating point of a decade-long argument between those who held that, when mange prevailed or was feared, horses should be kept clipped in any circumstances, and those who held that clipping in some circumstances was a greater evil than mange.

The question was settled in the British Expeditionary Force

* See page 380.

by a compromise whereby it became the rule that horses with field units should be clipped up to November 15th, but not after that date.

In considering what share late winter clipping may have had in the causation of the above-mentioned heavy mortality, the following facts should receive full consideration :—

- (1) The circumstances of cold, wet, and mud were exceptional, as all who served in the region of the Somme in the spring of 1917 know.
- (2) The ration then allowed was not the full service ration, and much of it was wasted in the mud.
- (3) The late clipping was, at the most, only a contributory factor and its importance, consequently, should not be overstressed.
- (4) Up to that time (before the construction of dipping baths in army areas) it was the opinion of the veterinary authorities of the B.E.F. that it was necessary to keep the animals clipped throughout the winter in order to avoid inefficiency and losses from mange, which would be greater than losses that might arise from any natural cause.

As the war advanced it became the policy to appoint, as transport officers to the infantry brigades of the New Armies, individuals who were specially selected for this duty on account of their experience of animal management in civil life.

Trainers of race horses, hunting men and others who had made the care of animals their profession or hobby were largely included in these appointments. This measure did much to improve and maintain the standard of animal management in the horse and mule transport of infantry formations. (At a later stage of the war officers were also specially attached to field artillery formations for duty as "wagon line officers").

The evident success of this policy led to its being extended by the appointment of similarly experienced individuals as "horse advisers" to Army Corps and Divisions in France and Belgium. It is open to question whether corresponding benefit was obtained by the appointment of persons in an advisory capacity.

The transport officer was an executive worker who attended in detail to the actual care of individual animals and produced concrete results. The responsibilities of the "horse advisers" were chiefly what their title indicates, and it was not possible in practice to distinguish exactly between their duties and those of the administrative veterinary officers responsible for the well being of the animals of the same formations. All, however, were working to the same end and the end was good.

Most of the difficulties that arose in connection with the watering and feeding of animals are described in the chapters of this history dealing with the expeditionary forces, especially those employed in the Eastern theatres of war. In France and Belgium the Veterinary

Services could not do very much to help the A.S.C. in the problem of animal feeding.

They could and did advise upon the standard rations and the food value of the many sorts of forage that were used, but departure from these standards was often in the later stages of the war a matter of sheer necessity from which there could be no appeal.

It became, for instance, necessary to use wheaten straw chaff very largely in lieu of hay.

Several attempts were made by commercial firms, chiefly of American nationality, to persuade the War Department to purchase varieties of compressed grain foods, but exhaustive experiment showed that oats in their natural form are contained in the smallest bulk compatible with a digestible and nourishing food for horses. Considerable use, however, was made of compressed forage composed chiefly of chaff, which in its natural state is extremely bulky. The potential value of this form of compressed forage for military purposes is obvious, but in practice it was difficult to avoid much waste when the bales were opened in windy weather.

Care in damping the forage will, it is true, prevent its being blown away by the wind, but facilities for damping it did not always exist. In Egypt, where the use of compressed forage for desert warfare was a necessity, the problem of avoiding waste was solved by the issue of exceptionally large nose-bags.

It is not necessary to include tables of standard rations in this chapter because sufficient records of these are to be found in other *publications bearing on the Great War.

An interesting question which stands, so to speak, astride the dividing line between animal management and veterinary surgery is that of putting to an economical use the mucky condition of the ground in the vicinity of the front line in a European war in winter by employing for duty in that locality horses affected with types of lameness which would not interfere with work on soft ground. This proposal was made during the late war, but was not adopted. Horses in France, which were considered to be serviceably sound but not fit for general service, were specially marked and issued to the Remount Department for work on the lines of communication. Many of these animals were slightly lame from certain forms of exostosis or other minor structural abnormalities, conditions in which it is especially desirable to avoid work on hard roads. It was suggested, apparently with truth, that many of these animals could have been worked with more benefit and less individual inconvenience in the soft mud than on the roads of the lines of communication. It is estimated that, in the aggregate, there were many hundreds of animals standing in veterinary hospitals and employed on light work on the lines of communication which would, on the whole, have been better off working in the mud. This circumstance is recorded partly for its historical interest and partly as an instance of the desirability on economic grounds for a unified Remount and Veterinary Service.

* Particularly "Field Service Scales of Rations." War Office, March, 1919.

It may be thought that the knowledge accumulated by the Army Veterinary Service in respect of animal management may now be rolled up and stored away in its archives, because in a future war it will not be needed. It is more likely that it will be very urgently needed. The tendency of the times is for the knowledge of animals in war to become more and more a monopoly of the Veterinary Service in proportion as the intelligence of the army as a whole is becoming increasingly concerned with mechanical means of transport and attack.

Those who witnessed and depended for their sustenance and means of defence upon the work of pack animals in bringing up food and ammunition through constantly shelled, muddy ground, which was impassable for wheeled transport, will agree that animals are necessary for warlike purposes. They will say that it is not easy to imagine any form of transportation which, in similar circumstances, could replace that of pack mules and cobs. Similarly, in mountain warfare the pack animal is essential.

Motor transport had much to do with the success of the British military operations in Egypt, but the bulk of those operations would have been impossible without camels, horses, mules, and donkeys.

In Mesopotamia at certain seasons motor transport had entirely to give way to animal transport, and here undoubtedly the mule and the despised ox saved the situation.

It may be anticipated that in future wars almost the only knowledge of animals of any value will be the specialised possession of the Army Veterinary Service, who will carry on, until the last domestic beasts of burden disappear from the service of man, the traditions of animal lore which their predecessors have so painfully acquired.

It may be recorded here that the mule proved far more resistant than the horse to adverse circumstances of animal management, just as he proved superior in every veterinary respect. The following statistics and points refer to some of the advantages of the mule:—

- (a) Mortality among mules consequent upon transportation by land and sea was less than one-half that among horses.
- (b) Mortality from disease and all causes in the field was less than one-half that among horses.
- (c) Liability to disease (including mange), necessitating evacuation to veterinary hospitals, was less than one-half that among horses.
- (d) The mule could be kept in good condition on a food ration which was 25 per cent. less than that of the average of the horse.

At the other end of the scale stood the light draught horse. Owing to the progressive displacement for rapid transport purposes of the light draught horse by steam and petrol power, this type of animal of the better class has become increasingly difficult to find.

The type was exemplified at its best by the English coach horse, and in more recent times by the animals of omnibus companies, but with the cessation of demand the supply has greatly diminished.

The light draught horse of to-day is often a cross between widely dissimilar types, such as the Shire or Clydesdale and the Hackney. Such a cross-bred animal as a rule does not exhibit the quality and stamina of the true bred coach horse, which could trot steadily on hard roads at eight miles an hour with a substantial load daily, and for long distances without detriment either to bodily condition or soundness.

Very many of the light draught horses used in the Great War did not fulfil these exacting requirements, and in addition to this physical handicap they were called upon to do the most arduous work of the campaign in the Field Artillery and other branches of the army. The result was that this class of animal contributed, in all theatres of war, much more than its fair proportion of wastage from sickness and mortality.

The great losses from pneumonia that occurred during the first year of the war among *heavy* draught horses in the United Kingdom and on first landing in France made it appear doubtful whether the purchasing of these animals should continue.

When the employment of heavy horses was first suggested several years before the outbreak of the Great War, veterinary officers with experience of these animals foresaw their weakness for military purposes, and anticipated the heavy loss which would ensue if they were indiscriminately employed in war. A representative of the Army Veterinary Service gave evidence in London in 1915 before a committee of enquiry into the utility of the heavy draught horses for purposes of war. His evidence was to the effect that the heavy draught horse was not suited for warlike purposes because of great susceptibility to disease, large food and watering requirements, and inability to stand forced marches.

Before the end of the year 1915, however, the excessive mortality among heavy draught horses purchased in Great Britain was brought under control (*see* the section on Respiratory Diseases in Chapter XXIII), and from then onwards the exceptional circumstances of fixed trench warfare provided abundant opportunity for the economic employment of heavy horses in France.

The individual food requirements of a heavy draught horse are, it is true, approximately twice those of a mule, but a pair of good Shire horses will do the work, nearly, of four average mules, so long as nothing faster than a walking pace is necessary. The substitution of pairs of heavy horses for teams of four light draught horses or mules meant fewer attendants and less equipment, shoeing and accommodation. It was demonstrated in short that under certain conditions of modern warfare (as under certain conditions of peaceful industry) the enormous hauling capacity of the English Shire horse is still an important economic factor in the problem of road transportation of heavy loads.

The chief veterinary objection to the heavy draught horse, apart from its susceptibility to respiratory disease on first purchase, was the extraordinary liability to eczematous and necrotic affections of the legs and feet in wet weather, due partly to the impossibility of keeping dry the very hairy legs and partly to the lymphatic constitution of this type of horse.

A point which was completely established was that the limit of the ages between which a horse is able to withstand the rigours of active service is very narrow.

The unsuitability of immature animals for hard work needs no comment, but the inability as a rule of a horse of over twelve years or thereabouts to recuperate from debility induced by unfavourable conditions was scientifically observed and demonstrated on an adequate scale for the first time in military history. The conclusion reached was that on the whole it was better for an animal employed in circumstances of trench warfare in the climate of northern Europe to be too young than too old.

For an intermittent series of severe muscular efforts age is an advantage rather than an impediment, but prolonged continuous exposure to wet cold weather and unfavourable conditions of management were better borne and more quickly recovered from, by the younger animals.

In the highly artificial environment of transportation by land and sea and the usage of war, a domesticated animal may suffer in an infinite variety of ways from defective or careless management.

This statement may be illustrated graphically if one follows in imagination the remount from his home on the Canadian prairie to his ultimate destination in a gun team on the Western Front.

The first stage of his journey was by rail to a dealer's stockyard at a remount purchasing centre, where he arrived in a soft condition, unseasoned, perhaps never before exposed to specific bacterial infection, and unused to harness or restraint.

Not infrequently horses died from that form of pneumonia known in the American vernacular as "shipping fever" at this stage of the journey or in the immediately subsequent stage of onward transportation to the remount depots at the Canadian ports of embarkation.

In the later stages of the war, animal management in the form of routine temperature-taking and avoidance of long unbroken journeys prevented this sudden end to their career.

By means of careful feeding and handling in the remount depot at the port of embarkation the animal was brought on board the horse-transport in good condition, recovered from shipping fever or strangles, and consequently to some extent was immune to the common bacterial infections. The risks on board ship during the voyage were surgical injuries from the effects of rough weather, inattention to fittings, lack of care in separating kickers or vicious animals from the others, neglect in watering or ventilation, and many minor details.

On arrival in England the animal ran the risks inseparable from sudden change of climate, exposure to new infections, frequent change of locality and of companions, any one of whom might take a sudden dislike to him (as horses will) and administer a kick or bite of which the effects might prove fatal.

His restiveness during the unaccustomed business of shoeing might cause a newly fledged shoeing-smith to misdirect a nail with serious consequences.

Issued to a unit of barely trained personnel mobilizing under canvas, he might find himself insecurely picketed and either join in a fatal stampede or die of some intestinal disorder from over-eating in the course of a nocturnal raid on an unprotected stack of forage.

In the routine testing with mallein for glanders, applied to all horses before their issue to units and departure overseas, the subject of this illustration might be one of the very small percentage of animals that were found to be infected and were at once destroyed. If he escaped all these dangers and embarked for France his risks on the channel voyage were small but not entirely negligible.

Once arrived in France the nature of the risks depended upon the duty in which his unit was employed. If he took part in a phase of movement, he might pick up a nail and develop quittor, develop a severe harness gall, fall down and break his knees, sustain a serious strain or bit-injury, become rapidly and hopelessly debilitated from lack of attention to watering and feeding or over-work, or otherwise become a casualty in one of a multitude of ways. If he found himself in the wagon-line of a battery engaged in trench warfare he would be liable from lack of exercise to engage in battle on his own account with an adjacent horse and get his leg broken.

In severe wet wintry weather there was a risk of fatal debility from simple exposure to the elements combined with insufficient individual attention.

The bacillus of ulcerative lymphangitis, the bacillus of necrosis, or the unknown causal organism of specific ophthalmia might subtly emerge from the soil of France and penetrate his tissues through a lesion of the skin that was hidden from observation by the mud which thickly covered his legs. He was lucky if he escaped contracting mange at some time or other.

There was always the chance of battle injury from the ground, the air, or from gas attack, depending to some extent on the use or neglect of means of protection. These were a few of the risks; to mention them all would be tedious; and enough has been said to indicate the scope for animal management in war.

The management of animals in tropical and sub-tropical countries where protozoal diseases were enzootic was greatly complicated by the problem of how to get the best work out of animals infected with trypanosomiasis. This applied especially to camels whose management became entirely a veterinary problem.

The value of the Empire as a whole in providing facilities for

training specialists in tropical diseases was abundantly exemplified in the remarkable work accomplished by officers who had obtained experience in the civil veterinary departments of India, Egypt, and the colonies. Indeed without their assistance the Army Veterinary Service would have been gravely handicapped in a world-wide war.

Our knowledge of camels, which were so extensively employed in the eastern theatres of war, was derived very largely from personnel of the civil veterinary departments of Egypt.

Officers of the civil veterinary department of British East Africa themselves grappled with and as far as was humanly possible dealt effectively with the problem of equine trypanosomiasis, rinderpest and piroplasmiasis of cattle in East Africa, which, though essentially veterinary matters, were nevertheless bound up with the question of animal management.

Veterinary officers who had served in the civil veterinary department of Canada originated the dipping baths in France which played an important part in the business of maintaining in a serviceable state the enormous animal strength of the British Expeditionary Force.

An officer who had been trained in the hard school of veterinary research in South Africa suggested the principle of routine temperature-taking of remounts as a means of preventing mortality from pneumonia.

The modern veterinary hospital was developed step by step from an idea which materialized many years ago in the field veterinary sections of India.

Management of animals so far as shoeing was concerned was made possible for war on a gigantic scale by the efforts of the Army Veterinary Service in securing the adequate training of shoeing-smiths in the schools of farriery and by other means.

The impossibility of getting horses sufficiently exercised in army areas in conditions of trench warfare when the personnel of the units concerned were not available for this duty was a prolific cause of casualties among the animals, which either became mischievous and vicious from enforced idleness or in cold wet weather became debilitated. It is a curious fact that animals can stand exposure well if they are loose and thus able to turn their backs to the wind, but that they soon waste away if tied up and are consequently unable to change their position.

The introduction of a system whereby horses were attached at intervals on either side of a long rope with a mounted man at each end did much to facilitate the business of exercising convalescent horses in veterinary hospitals.

The difficulty of how to maintain animals in a serviceable state in the extraordinary circumstances of the Salonika front was solved by the Director of Veterinary Services in that theatre by the novel but simple means of turning the horses and mules entirely loose in the day time to wander at their will over the hillsides.

Difficulties occurred which were insuperable. The long, waterless forced marches in Palestine, and the absolute breakdown in the

transport of forage supplies in South-West Africa are instances of conditions in which all attempts at remedial effort were futile.

It is instructive to observe in the chapter on the Western Front that when the advance to the German frontier took place at the end of the war, one of the effects of years of trench warfare was the inexperience shown by the fighting personnel of mounted field units in the details of the management of animals on the march.

During the long stationary period the animals in the wagon lines behind the trenches had been supervised chiefly by personnel other than the officers and N.C.Os. of the units concerned, who were mostly concerned with dismounted fighting duties. The latter had become relatively unaccustomed to the management of horses, and in many cases had obtained no experience of this part of the normal work of a mounted unit.

CHAPTER IX.

THE VETERINARY SERVICES IN FRANCE AND BELGIUM.

Section I.

Organization.

THE organization of the Army Veterinary Services with the British Expeditionary Force when it first went overseas in 1914 was as follows :—

- A Director of Veterinary Services and Deputy Director at the headquarters of the Inspector General of Communications.
- An Assistant Director of Veterinary Services with each cavalry and infantry division.
- An executive veterinary officer for each of the following field formations :—

- A cavalry regiment.
- A horse artillery brigade.
- A cavalry divisional signal squadron.
- A field artillery brigade.
- A divisional ammunition column.
- An infantry brigade.
- A divisional train, and for
- 2nd echelon headquarters.
- An officer i/c records at the base (3rd echelon).

Veterinary units as follows :—

- 6 Veterinary hospitals, each for 250 patients.
- 11 Mobile veterinary sections.
- 2 Base depots of veterinary stores.

The total strength of A.V.C. personnel was 122 officers and 797 other ranks.

The total number of animals on the strength of the force was 53,000.

The animal strength subsequently rose to approximately 450,000, and the veterinary organization ultimately was :—

A Director of Veterinary Services, with an assistant and deputy-assistant at general headquarters (on the staff of the Quartermaster-General).

A Deputy Director for each army headquarters, and for the northern and southern lines of communication.

A Deputy Director for the cavalry corps.

An Assistant Director for each corps headquarters and cavalry division.

A Deputy-Assistant Director for each infantry division.

One executive officer with headquarters, cavalry corps.

Two executive officers with each cavalry brigade.

An executive veterinary officer with cavalry divisional troops.

Three executive officers with each infantry division.

An executive officer for advanced horse transport depot.

Two executive officers with each remount depot.

An executive officer for Marseilles base and for embarkation duties.

An executive officer for each of the following areas :—

Havre.

Rouen.

Abbeville and Amiens.

Calais and District.

A serjeant A.V.C. for each infantry brigade, field artillery battery and many other units.

The following veterinary units :—

18 Veterinary hospitals, each for 2,000 patients.

4 Convalescent depots, each for 1,200 patients.

16 Veterinary evacuating stations.

*50 Mobile veterinary sections (approximately).

2 Base depots of veterinary stores.

1 Veterinary bacteriological laboratory.

A disposal of animals branch.

The strength of the Army Veterinary Service in France at its highest was 651 officers, 15,000 other ranks.

In addition to the foregoing, the dominion forces provided two veterinary hospitals, two veterinary evacuating stations, eleven mobile veterinary sections, with personnel whose total was 114 officers and 1,446 other ranks.

It was natural that early in the course of building up this large organization, as it became necessary to meet the ever-increasing requirements, it should be found that the establishment of administrative officers as laid down originally was insufficient. Many temporary expedients were tried, but the first permanent step was taken when, in 1915, approval was obtained for the appointment of a Deputy Director of Veterinary Services with each army. This measure made the original appointment of a Deputy Director of Veterinary Services at headquarters unnecessary, and it was consequently abolished. The next step was the appointment of two Deputy Directors of Veterinary Services for the lines of communication. These were allotted respectively to a northern and southern area. The veterinary directorate at general headquarters was strengthened by the addition of an Assistant Director, and, later on, a Deputy-Assistant Director.

In 1916 the veterinary and other directorates of administrative services were transferred from the headquarters of the Inspector General of Communications to the Quartermaster-General's staff at general headquarters.

In 1917 approval was obtained for the appointment of an Assistant Director of Veterinary Services with each corps headquarters. This measure followed the general policy of transferring to corps

* The number of mobile veterinary sections of course varied with the movement of formations to and from France.

headquarters much of the responsibility for direction of administrative services which was formerly vested entirely in divisional headquarters. A natural consequence of this change was the reduction of the grade of administrative veterinary officers with divisions to that of a Deputy-Assistant Director.

The final change was the appointment of a Deputy-Assistant Director of Veterinary Services to the southern area, lines of communication, in addition to the existing Deputy Director of Veterinary Services.

In the review, in the light of subsequent experience, of the steps that were taken to bring the administrative organization of the Army Veterinary Services into line with the ever-increasing requirements, it is evident that no permanent step was taken which was not fully justified by events. It should, however, be recorded that the proposal to appoint Assistant Directors of Veterinary Services to corps headquarters was at first questioned. It was feared that the available supply of officers A.V.C. would be seriously affected by this considerable addition so that the loss to the executive side of veterinary work would over-balance the gain to the administrative side. The matter was finally settled by the Quartermaster-General as the result of his investigation on the occasion of a visit to France. His decision was that the appointments were necessary, and the necessary re-distribution of officers was made accordingly.

Section II.

Veterinary Administration at the Front.

A general knowledge of veterinary administration in the field had, in pre-war days, usually been difficult to acquire, and was limited to that required for examinations for promotion to the rank of lieutenant-colonel. It was, however, appreciated by some home commands that those officers, mostly of the rank of major, earmarked for administrative appointments in war should receive some training in technical staff duties. With this end in view, a technical staff exercise was carried out in 1914, and, in addition, selected officers A.V.C. were permitted to attend certain general staff rides. This experience, little as it was, proved of some help to those officers to whom facilities had been accorded, when they were thrown on their own resources to build up the veterinary organization in the Great War.

Viewed from a retrospective standpoint, the enormous aggregate wastage from animal casualties of a modern war was under-estimated, and in consequence it is conceivable that the service dealing with the sick and wounded animals was not, in anticipation, given the attention it merited. Administration had to be learnt by experience. Step by step during three years the policy was evolved, thanks to the stability of the front under the conditions of war of position and the devoted enthusiasm of the corps to ensure success. Moreover,

the experience gained by officers of the original British Expeditionary Force gave a good basis on which to build later the expansive structure of the New Armies.

It would obviously be impossible, in the limited space available for this chapter, to give a complete history of the veterinary administration in the field throughout the war. Consequently this section is limited to a description of the more important veterinary difficulties that arose, and the means that were taken to deal with them, during the extensive movements of troops which occurred in the preliminary and final stages of the campaign, namely :—

- (1) The retreat from Mons and subsequent advance to the Aisne in August and September, 1914.
- (2) The advance to the German frontier and subsequent occupation of the Rhine Province in the autumn and winter of 1918.

The retreat from Mons and advance to the Aisne, 1914.

The opening phase of the war, the retreat from Mons to Paris, was a high test of endeavour often falling short of achievement owing to personal fatigue and the continual movement of troops : often information was received too late to be acted upon, as will be seen later in reference to supply railheads.

During concentration, the A.Ds.V.S. (as then termed) of divisions began, in many instances, their training in such essentials as map-reading, map references, orders of march and operation orders. As at that time there was no representative of the A.V.C. at headquarters of corps, the D.D.V.S. at general headquarters could not devote much time to their assistance.

The first three months of the war can be sharply divided into the following phases :—

- (1) Concentration.
- (2) Movement by retreating.
- (3) Movement by advance.

For convenience and sequence of events, the phases are arranged in the order in which they actually occurred.

1. Concentration.

A conclusion was soon reached that the control of movement of mobile veterinary sections with infantry divisions and cavalry brigades by the Director of Veterinary Services at headquarters of the Inspector-General of Communications, as laid down by the Field Service Regulations then in force,* would not be practicable. The accepted view, before actual experience in the field, was that mobile veterinary sections should confine their zone of activity between supply railheads and the divisional area, and be

* This matter is now placed on a satisfactory footing by F.S. Regns., Vol. 1, 1923, and Veterinary Manual for War.

practically lines of communication units. The succeeding narrative will show, at least in a movement of retreat, how impossible this plan proved itself to be.

The A.Ds.V.S. of some divisions obtained, when in the concentration area, the authority whereby these units were placed under the orders of the divisional or cavalry brigade commander, so that their movement might be controlled by his administrative veterinary officer. The idea of controlling them by general headquarters was unworkable.

It was fortunate that these units were self-contained and mobile, and adaptable to circumstances. They worked throughout the war as strictly divisional or cavalry brigade units and rendered most efficient service.

The short duration of the interval between concentration and contact with the enemy, and the retirement, with its casualties, was possibly not expected. Had the retreat not taken place the veterinary hospitals would no doubt have been pushed forward. During August, 1914, the original six veterinary sections forming the three hospitals were being installed.

Nos. 7 and 8 at Amiens.

Nos. 5 and 6 at Rouen.

Nos. 1 and 2 at Le Havre.

The nearest veterinary hospital during the first phase was at Amiens, eighty miles as the crow flies from Maubeuge,* whilst Rouen was 170 miles and Le Havre 240 miles distant. It will be appreciated that the rail communication was not necessarily direct; consequently the time that returning supply trains bringing sick animals will occupy en route cannot be calculated upon the distance only.

No doubt the policy was one of safety by a progressive advance from the sea bases, and what actually happened was anticipated, i.e., to give ground to the enemy at the commencement, which meant the cutting out of certain important railway junctions, as Valenciennes, Douai, Arras, Cambrai, St. Quentin, La Fère.

It is obvious that the veterinary evacuation situation is dependent upon rail communications and the availability of rolling-stock, although rivers and canals are occasionally used. At first sight the lines of communication veterinary units looked safe enough, even allowing for a preliminary yielding of a certain amount of ground, yet a month had not passed before the military situation compelled the move of the lines of communication to the south of the Seine.

A veterinary hospital is not an institution that can be quickly established, and at this juncture attention is drawn to the value of a proportion of tented veterinary hospitals for a field force.

*Amiens from Maubeuge via St. Quentin and La Fère or via Arras is 160 kilometres (100 miles) on either route.

2. *Movement by Retreating.*

The most difficult manoeuvre the Army Veterinary Services had to cope with was the disposal of non-marching cases when being harassed day after day by the enemy in pursuit, as actually occurred during thirteen days in succession when the army, retreating from Mons, covered 200 miles before a halt was called. Veterinary evacuating stations (not then come into being) would not, it is thought, have reduced the difficulties in the evacuating of cases during the great retreat, though on the return to the offensive they would have been most useful.

The channel of veterinary administration in force from August, 1914, to February, 1915, was from the D.V.S. on the headquarters of the Inspector-General of lines of communication, direct to the A.D.V.S. of divisions, or through his representative, the D.D.V.S. at general headquarters. The D.V.S. was at this period much occupied in the selection of sites for veterinary hospitals on the lines of communication especially; the military situation demanded this close attention because the hospitals that were already in position had to be moved to the south of the Seine. The connecting link therefore between the field army and the lines of communication was vested in his deputy.

In the light of after events, the co-ordination of control of the evacuation of sick and wounded animals would not have been carried out with less difficulty had the appointment of A.D.V.S., corps headquarters, been in existence. It is difficult to imagine any form of administrative organization that could have overcome the physical drawbacks accompanying the effort of tired men and animals of A.V.C. units to continue the day's march another four or five miles to a supply railhead and then, on its completion, to rejoin the column on the line of march next day without definite knowledge of what route it would take, or how enemy patrols might be avoided. The railhead often closed as soon as the trains were off-loaded in the morning; consequently, by the evening the party might, on arrival at the railhead, find it closed and the empty trains departed. When the railheads were in the direct rear of the formation more could be attempted, but often they were slightly on a flank and, in the retreat under reference, the possibility of meeting with hostile cavalry patrols was a vital consideration.

The following extracts from the War Diary of the A.D.V.S. of the 1st Division are given to illustrate in detail some of the difficulties that occurred in the evacuation of animal casualties during the first six weeks of the campaign:—

Closing Stages of the Retreat from Mons, August 28th to September 5th, 1914.

Situation at 8 a.m., August 28th:—

Headquarters 1st Division and 1st Infantry Brigade at St. Gobain.
2nd and 3rd Infantry Brigades at Bertaucourt and Fressancourt.
The Divisional Ammunition Column at Barisis.

No. 2 Mobile Veterinary Section (Captain A. S. Lawrie in command) not yet rejoined division after having attempted to clear sick from La Fère railway station.

Railhead : Chauny (eighty miles) or La Fère.

Roads crowded with refugees, causing traffic to become double-banked.

The general intention was to fall back further on a line a little to the south of the River Aisne between Soissons and Compiègne.

August 29th, 10.30 a.m.

Went to La Fère railway station and found that the mobile veterinary section had left for Chauny, which it could not reach before 2 p.m. when it would, according to information obtained from a staff officer of Q.M.G., army headquarters, find that all rolling stock had already left. The situation was discussed and the difficulties of the evacuation of sick and wounded horses under conditions of continuous changes of railhead were brought to his notice. It was reported that the mobile veterinary section had taken the most direct road, viz., west of the Crozat Canal and railway line, i.e., La Fère—Tergnier—Chauny; consequently as it was understood that the railway and road bridges on this road had been destroyed, the safety of this unit was then uncertain.

On proceeding to Chauny there was no sign or news of the mobile veterinary section, and the cavalry were retiring to the east of the canal and preparing to demolish the bridge. The division made a short march of seven miles to Coucy-le-Chateau. A convoy of forty-three sick from various points was arranged with a view to early arrangements being made if possible for their evacuation. At the same time, Lines of Communication were wired for trucks, but as no reply was received, the sick were disposed of as follows :—

43rd Brigade R.F.A.—27 (returned to their camp).

25th Brigade R.F.A.—12 (handed to H.Q. Co., divisional train).

Divisional Headquarters—2 (returned to their units).

15th Hussars—4 (returned to their units).

1st Divisional Train—1 (returned to its unit).

Railhead was now changed to Attichy, eighteen miles distant. The mobile veterinary section rejoined the division, reporting that it was turned back to Tergnier and moved via La Fère, which place it just cleared before our rearguard left.

Nos. 1 and 2 bases commenced to be moved from Havre and Rouen to the mouth of the Loire, and established provisionally at St. Nazaire and Nantes with an advanced base at Le Mans.

6 p.m. Orders received for further retirement, moving early next morning.

August 30th.

Marched from Coucy-le-Chateau to Pinon (three miles). 5 a.m. Will try to clear to Attichy to-day.

Divisional Headquarters : Chateau de Pinon.

1st Brigade Group .. Allemant.

2nd Brigade Group .. Anizy at railhead.

3rd Brigade Group .. Brancourt.

Railhead Anizy.

Drove in car to Soissons to arrange trucks from Anizy on August 31st. On returning to divisional headquarters found telegraphic instructions from D.V.S., B.E.F., not to attempt to send sick until new advanced base was established.

Day intensely hot. Severe road gradients, and crowded with refugees and vehicles.

August 31st.

Marched from Pinon to Missy (Cravancon Farm), fourteen miles; steep, long hill to finish march; several horses died during the final effort. Gradients south of the river very steep; water scarce and of bad quality. Heat severe for man and beast.

September 1st.

From Missy to La Ferte Millon via Soissons road on the east side of Villers-Cotterets and then south-east to La Ferte-Millon (Bourneville Farm), eighteen miles, completed between 7 and 9 p.m. Heat of day intense. Casualties for replacement were 247.

September 4th.

Ferte-sous-Jouarre to Coulommiers, ten miles.

Saw the staff officer of the 1st division *re* trucks; those available were only for sick and wounded and refugees. The A.Q.M.G. advised me to march them to Melun via Pezarches, Chaumes, Verneuil to Melun, which was then the railhead of the division. The road to our rear, i.e. towards Pezarches and Chaulnes, was none too safe as some Uhlans were shot during the night and refugee trains were fired upon. Tried to evacuate from Verneuil. Asked a staff officer going there to enquire. Moved No. 2 Mobile Veterinary Section from 2nd Brigade Group Area at Bernay to report to O.C., 1st Divisional Train at Pompei re this afternoon at 6 p.m., and march with it; it will be nearer Verneuil. Went to railway station, Coulommiers. D.V.S. notified me by telegram that sick would be evacuated to field veterinary hospital at advanced base Le Mans. Colonel Butler, D.D.V.S., visited me and gave instructions *re* evacuation of sick and wounded.

Railhead to-day, 1st Division: Mormant.

September 5th.

The O.C., No. 2 Mobile Veterinary Section, lost touch with the divisional train, so was ordered to join in column behind advanced guard.

Marched at 8 p.m. from Coulommiers to Rozoy. End of retreat of thirteen days' duration, in which men marching did at least 200 miles, although actual map distance was 136 miles.

Railhead, 1st Division: Melun.

The return to the offensive, culminating in the battle of the Marne, commenced.

3. Movement by Advance.

Illustrated by further extracts from the War Diary of the A.D.V.S.
1st Division:—

September 6th.

The 1st Division marched from Vandoy to Choisy and was engaged all day forcing passage of the Grand Morin.

During these days, No. 2 Mobile Veterinary Section evacuated seventy-two cases on 6th, and forty cases on September 7th from Verneuil, and rejoined the division at Coincy on September 11th.

Railhead, 1st Division: Melun.

September 11th.

March from Latilly to Coincy. Used forge at Coincy, and utilized locally requisitioned shoes and iron.

No. 2 Mobile Veterinary Section rejoined division.

Supply railhead, 1st Corps, 1st Division, same as on September 10th.

September 12th.

From Coincy to Bazoches. The divisional train arrived having with difficulty traversed roads with bad holes and greasy surface.

Supply railhead, 1st Corps, 1st Division: same as on September 11th.

September 13th.

Marched from Bazoches to Bourg.

Under orders of D.D.V.S., G.H.Q., No. 2 Mobile Veterinary Section was diverted on line of march to Braisne to attend to sick of 5th Cavalry Brigade, which duty was completed on September 16th.

September 16th.

Headquarters, 1st Division : Bourg.

At 9 a.m. No. 2 Mobile Veterinary Section rejoined division. Gave O.C., Mobile Veterinary Section, orders to clear sick from supply railhead, Fère-en-Tardenois, but he was diverted to Mont Notre Dame.

The horse requirements to complete division were :—riding, 150 ; light draught, 500 ; heavy draught, 150.

Many others in the division required rest and conditioning.

Whilst on the Aisne front the sick and wounded animals were entrained at either Mont Notre Dame, Fismes, or Braisne, to the advanced veterinary hospital a detachment of Nos. 7 and 8 Sections from the main veterinary hospital at advanced base (Le Mans) which was established at Villeneuve St. Georges, ten miles south-east of Paris, to receive sick from the Marne and Aisne battle fronts. The entraining railway stations above referred to were not the supply railhead, and the wagons had usually been used previously for the conveyance of animals, sometimes remounts. This is an instance of another pre-war misapprehension that returning supply trains could be used to convey horses to the base. The undesirability of such a practice on sanitary grounds is obvious. There is also the important traffic objection of breaking up the composition of the train consequent upon the wagons being detached on arrival at the base in order that the sick may be detrained when there are no facilities for their detrainment by means of ramps. It raises the interesting point of whether any reliance should be placed on obtaining accommodation in the returning supply trains.

The following procedure, etc., was the normal :—

- (1) The position of railheads was notified in Operation Orders,* which were secret.
- (2) The A.D.V.S. was not ordinarily informed.
- (3) The Operation Order originated from G.H.Q., usually in the evening, reaching the division between, say, 10 and 12 p.m.
- (4) The railhead was for the following day only, and the supply motor transport sent out during the night was usually filled and clear of railhead by 10 a.m.
- (5) Even if the information was received by the A.D.V.S., sick animals could not be marched at night, and the distance precluded any chance of getting the animals to the railhead in time.

It should be noted that, even when a forward movement of the force is taking place, the railhead may remain the same, thus increasing the distance from the division.

The mobile veterinary section is too small a unit to be divided, and on occasions, even where safety permits, the conducting party may get lost with its convoy of sick.

These difficulties arose during the normal advance when successfully encountering the enemy and also during the subsequent pursuit.

* The first reference to railheads is seen in Operation Orders No. 10, dated August 28th, 1914, of the C.-in-C., B.E.F.

The point to be decided was often whether the mobile veterinary section should cling to the division or cut itself free and proceed to the railhead. There existed always in the latter alternative the risk of finding the railhead closed and no one to give any information as to the new railhead and no facilities for communication with the division or higher authority ; consequently the mobile veterinary section sometimes temporarily lost touch with the force.

The provision of rail conducting parties for sick animals was difficult from details other than A.V.C.

The A.D.V.S., and the O.C. mobile veterinary section, carried out extra duties not anticipated ; for example, the detrainment of remounts, conducting them from railhead and distributing them to representatives of divisional units. The records show that many hundreds of animals were thus handled during the first few weeks of the campaign.

It occasionally happened that sick animals were evacuated by the train which brought the remounts but as a rule sufficient notice could not be given. Without any doubt the sick horse train is the best solution of the difficulty but, owing to the military exigencies at that period and the shortage of rolling stock, it was not possible to arrange it. Now that an administrative veterinary officer is provided at corps headquarters and the veterinary evacuating station is included in corps troops, better evacuation arrangements are provided for the future.

The Advance to the German Frontier and Occupation of the Rhine Province.

The operations on which this section is based are those of the Second Army which returned from the Italian front in May, 1918, took over its previous sector at Ypres salient, and eventually marched through to the Rhine. Although the German offensive was spent, the army front, the back areas and base ports were subjected to intensive night-bombing. The army area lost depth and took over ground and stationary units which had previously been administered by the lines of communication. The advance veterinary hospital (No. 23) at St. Omer accordingly came under the administration of the D.D.V.S., Second Army.

Certain horse-dips in corps areas were badly damaged by long-range shell fire. One was left *in situ* on the enemy penetrating at a point to a depth of approximately four miles.

Courses of veterinary instruction on detail of duties were arranged for officers and other ranks of the Army Veterinary Services of the American Divisions located in reserve areas preparatory to being thrown into the line.

The organization of American divisions serving in France comprised a divisional headquarters detachment, five veterinary units, and one mobile veterinary section, the total personnel being eight officers and thirty-nine other ranks.

As there was no veterinary hospital at this period for the sick and wounded from American divisions, the animals evacuated to British veterinary hospitals had, for reasons of accounting, to be specially dealt with. The American mobile veterinary sections, by reason of transport shortages, experienced considerable difficulties in moving with their formations.

A scheme of veterinary arrangements in the event of the allied forces being compelled to retire to a new position was drawn up and completed by the end of June.

The 16th Corps d'Armée (Directeur du Service, Vétérinaire-Major 1st Class J. Bouchy) came under the administration of the Second Army. All assistance was rendered including facilities of evacuation through British field veterinary units and admission for treatment to veterinary hospitals.

Plans were made for the evacuation of marching cases by road and river to the reception veterinary hospital at St. Omer instead of by rail, the more serious cases being sent by sick-horse trains to hospitals further down the lines of communication.

A series of halting places, designated "sick-horse halts," were arranged so that the A.V.C. of each division in the line could march their sick animals by short stages to the reception veterinary hospital along unfrequented roads, the first stage being in the rear or clear of its divisional area. The sick-horse halts were apportioned to the mobile veterinary sections on a time-table to prevent two being at any one halt for the same night. A serjeant, A.V.C., was in charge of each halt, and the rations and forage were provided under army arrangements. The patients and conducting party were comfortably accommodated, rationed and foraged, and any case unable to proceed was retained. First-aid was available. These sick-horse halts rendered excellent service and were appreciated by divisions. Many thousands of cases were evacuated by means of them; this was also a relief to the railways.

Non-marching cases from June to October, 1918, were received and cleared by the corps mobile veterinary detachments (later to become veterinary evacuating stations) at specified railheads on a programme controlled by the D.D.V.S. who, from the daily states of the mobile veterinary sections, arranged the provision of sick-horse trains, although in certain circumstances, e.g. moves of divisions, special arrangements were made. The sick animals of reserve areas were cleared by road and horse ambulance to the receiving veterinary hospital.

Particulars of veterinary arrangements, based on the battle scheme, were drawn up early in July after a conference with the A.Ds.V.S. of the II, VII, X, XV and XIX Corps. They allowed for services during operations in the present battle zone or in the rear zone.

A detail of the moves in this emergency covered two groups of operations:—

During operations in the Blue Zone.

During occupation of the Blue Zone.

The orders which comprised, principally, the location of sites in the new area for the veterinary evacuating stations and the reception veterinary hospitals, the routes to be taken by them and by the marching sick, were drawn up in conjunction with traffic circulation arrangements. Plans in addition were also drawn up, in the event of the tide of war turning to our advantage and culminating eventually in an advance.

In these plans the utilization of waterways for transport was of importance, making the arrangements independent of the railways, though it was too much to expect them to be navigable through the trench zone.

In fact, in the final advance through Belgium to the German frontier, the canals in the devastated area were very little, if at all, used. They had on account of the severe damage to locks and waterways and the concentration on other more pressing reconstructions, e.g. railways and roads, been rendered impracticable for many months. The improvised sick-horse barges could therefore not get through, and those relinquished by the enemy could not be adapted in time to serve any useful purpose.

The D.D.V.S., Second Army, was called to G.H.Q. for a conference on 22nd September, 1918, on the general situation, and received instructions to draw up a scheme of veterinary arrangements for the advance. The veterinary arrangements for the anticipated offensive chiefly dealt with :—

- (a) The map position of the four veterinary evacuating stations.
- (b) The railhead for the entrainment of casualties.
- (c) The barge-head available for one V.E.S.
- (d) The special sick-horse train arrangements.
- (e) Clearing by returning supply trains.

The arrangements to be carried out in the event of a successful issue followed by an advance were made known. They defined the location of the corps troops veterinary units for the first move, and any change of railhead and barge-head for clearing casualties connected therewith. The object of these instructions was chiefly to acquaint each army corps headquarters with the arrangements for the other corps engaged. They represented the plans worked out by the A.D.V.S. of corps co-ordinated by the D.D.V.S., agreed to by the headquarters staff of the army corps, and approved and issued under authority of army headquarters.

A letter was written to the Belgian Mission on September 24th asking for permission to use stables at Stavele and to embark sick horses in barges from there and subsequently at Eissendamme and Fintelle. Permission was accorded the following day. It was found possible to arrange for the despatch twice weekly of two barges containing 180 horses.

The casualties from enemy shellfire in the final offensive were 431 (260 fatal) and from bombs 69 (44 fatal). A large proportion of these cases was evacuated by the barges under ideal conditions for this type of case.

In accordance with the terms of the Armistice, the occupied portions of France, Belgium and Luxemburg were to be evacuated by the enemy by November 26th, 1918. A further withdrawal to the east of the Rhine was to take place at a later date.

The British advance after the signing of the armistice was carried out by the second and fourth armies, each composed of four corps of sixteen divisions. The sixth French army advanced in the left flank of the second army.

The second army comprised at first the II Corps (9th and 20th Divisions), Canadian Corps (I and II Canadian Divisions), and were concentrated in their allotted areas by November 16th, the Cavalry Corps operating in conjunction.

Veterinary arrangements for the advance to the German frontier were drawn up and circulated by the D.D.V.S. Second Army, copies being sent to the D.D.V.S., Cavalry Corps, for information.

Information was received that an enemy horse-rest station existed at Ainettes and at Borlez, also that a German veterinary hospital was located at Horion and at Lexhy. Instructions were issued as to the care of any stores that might be captured at these institutions. They were both located about fifteen kilometres north of Namur.

The enemy had built at Charleroi a horse-dip after our pattern with the following exceptions:—It was a little wider; the water was heated on the circulating boiler principle; a solution of cresol had been recently in use, though a lime and sulphur solution had been at some time in use; the water was sunk in a stoke-hole at the side of the bath and at a level of half-way between the water surface and the floor. The approach gangway for animals to the bath was zigzagged so that the second horse could not see the horse in front plunge into the bath.

At first three trains a day were the most that could be dealt with at railheads between Mons and Namur for ambulances, leave, and remounts for the second and fourth armies combined. Later the maximum capacity of nine trains a day was attained, even then a restricted service.

No. 7 Veterinary Evacuating Station had been pushed on in late November to Charleroi; it collected the sick and waited until the railhead advanced, displaying great initiative and resource in difficult circumstances.

Although the conditions of this advance were anticipated to be peaceful precautions were taken against possible misadventure, e.g. firing from stragglers and delayed action mines which went up repeatedly during the days of the repair of the railway line and the general advance.

The casualties were chiefly injuries due to inexperience in stable management and bad driving on the march.

On the march to the German frontier and beyond, harness galls were of common occurrence. During the week ending December 26th, 1918, 115 cases were reported. These cases were attributable to

marching heavy draught horses over hilly country in wet weather, harnessing up and moving off in the dark, insufficient application of dubbin, and difficulties in drawing it, neglect of harness inspection and adjustments at halts on the line of march.

Sand colic was also of common occurrence.

Outbreaks of influenza (pink-eye) occurred among horses of the 9th Field Ambulance. All concerned were warned. The source of the contagion was attributed to horses of the retreating German army, among which it had been prevalent. The German civil veterinary inspectors were approached with a view to ascertaining the prevalence and geographical distribution of the outbreak.

The D.D.V.S., Second Army, called on the Military Governor (British Zone) on December 27th to enquire concerning the existing facilities for getting in touch with German local veterinary authorities of each area occupied by British forces, in order to be kept informed as to the prevalence of contagious diseases.

Dr. Lothes was the superintending head of the civil veterinary organization for the Rhine province, and was courteous and rendered all possible assistance. The district veterinary inspectors were called upon. Influenza of a virulent type and glanders and mange were prevalent among enemy army relics and those of the civil population.

Posters were drawn up in English and German throughout the area, giving instructions respecting the reporting, etc., of contagious diseases. A considerable amount of inspection of horses of the local civil population was carried out by administrative and executive British army veterinary officers. The infected animals were quarantined.

At Cologne, the carcass-economiser plant comprised three steam-heated longitudinal containers, one having a capacity for 2,000 kilos and two for 3,000 kilos. The process occupied sixteen hours, viz., seven steam, seven drying, and two for cleaning. The production averaged seven to eight kilos of fat from each carcass; other by-products were dried residue for chicken food and bonemeal. When the carcass was unfit for the process a crematorium plant disposed of it.

The Cologne abattoir was up to date, the carcasses were moved on overhead rails to the storage chambers as an annexe and passed an automatic weighing machine which punched the weight on a ticket.

At the abattoir rail siding an installation carried out the cleansing of railway wagons by a mixture of steam and water controlled by a foot regulator, after which a hot disinfectant was sprayed in. One steam boiler was in use and one held in reserve.

In view of the ultimate reduction of the force and the disposal of animals unfit for sending to England or retention in the army of occupation, enquiries were made and a contract was entered into to supply horses for human food at the abattoir, Cologne, at a rate of 2* marks per kilo dead weight twenty-four hours after slaughter. This meat was distributed throughout the Rhine province.

* At that time the money equivalent value of 2 marks was 1 franc (French).

An alternative scheme was considered under which horses would be sent by barges to Amsterdam and the hides to London.

Animals were now being classified into unfit for further service, and those suffering from specific ophthalmia—D. for destruction.

The veterinary situation at the end of December, 1918, was as follows :—

- (1) Mobile veterinary sections with their respective divisions and cavalry brigades.
- (2) Veterinary evacuating stations :—
 - II Corps. No. 2 V.E.S. at Mulheim (Dec. 22nd).
 - VI Corps. No. 6 V.E.S. at Duren (Dec. 24th).
 - IX Corps. No. 9 V.E.S. at Euskirchen (Jan. 3rd).
 - Canadian Corps. Canadian V.E.S. at Bonn (Dec. 24th) relieved by No. 10 V.E.S. (Jan. 26th).

Before the veterinary hospitals became established, evacuation was effected by sick-horse trains from various railheads. One large consignment on January 6th, 1919, comprised forty-eight truck loads from various railheads making up at Duren (regulating station) for Calais.

Section III.

Executive Veterinary Work with Field Units.

During the first phase of the campaign—that of the extensive and rapid movements of troops which ended in October 1914—the bulk of the work of veterinary attendance to sick and wounded animals had to be done under regimental arrangements by the executive veterinary officers of units. The establishment of officers A.V.C. for executive duty with divisions, though liberal as compared with what it later became, was, during the first period, the lowest compatible with efficiency.

The rapid rearward movement made it impossible for mobile veterinary sections to exercise to an adequate extent their function of collecting and evacuating sick animals to veterinary hospitals. Sick animals that were unable to keep up with the line of march were destroyed, and those able to proceed were treated in improvised sick lines with their units. The farrier personnel gave such assistance as they could spare from their shoeing duties. At the end of this first period, when trench warfare supervened, it was possible to dispose of the large accumulation of sick to mobile veterinary sections, and the clinical work of the executive veterinary officer was consequently lightened.

It became impracticable in 1915 to maintain the existing establishment of veterinary officers with field units. Many experienced officers had to be sent to the United Kingdom for appointment as Assistant Directors of Veterinary Service of mobilizing divisions and to command veterinary hospitals and mobile veterinary sections that were being formed for the New Armies. The supply of newly joined officers sent from England was insufficient to meet the rapid

expansion of the force. It was necessary, therefore, to reduce establishments, at whatever cost to efficiency, although there was never a time when reduction of establishments was less desirable.

The standard of horsemastership in divisions of the New Armies then arriving was by no means comparable with that of units in the old Regular Army, and much inefficiency would have been avoided if it had been possible to maintain existing establishments of veterinary officers during this period. This was not possible, however, and consequently the following reductions were necessary:—

- (a) Withdrawal of two veterinary officers from each cavalry brigade and of the veterinary officer in charge of horse artillery brigades and signal squadrons.
- (b) Reduction of executive veterinary officers with infantry divisions from nine to five. The five veterinary officers were then included in the establishment of divisional headquarters for posting to units at the discretion of the G.O.C.
- (c) Reduction of the establishment of veterinary officers with reserve parks to one officer for every three parks.

The adverse effect of these reductions was to a large extent discounted by the measure which was simultaneously introduced of including a serjeant, A.V.C., in the establishments of infantry brigades and a reserve park.

This principle of including a serjeant, A.V.C., for first-aid veterinary duties in the establishments of field units was subsequently extended to the following formations:—

- Royal Field and Royal Garrison Artillery batteries.
- Auxiliary horse transport companies.
- Machine gun battalions.
- Headquarters of an army.
- Headquarters of a corps.
- Sections of a divisional ammunition column.
- A reserve park.

The appointment of these N.C.Os. not only helped to discount the shortage of veterinary officers, but filled a long felt want in providing a whole-time trained attendant to assist the veterinary officer.

The assistance which the farrier staff of units, even of the old army, under active service conditions, could give to veterinary officers was always restricted and sometimes failed entirely. Added to this, the farriers of the new armies had, for the most part, no knowledge whatever of first-aid treatment. The serjeants, Army Veterinary Corps, first selected for these duties were men already trained in veterinary hospitals and mobile veterinary sections. Arrangements were afterwards made for the special training of a sufficient number of men held in a "pool" at Havre to meet requirements. A large number of N.C.Os. thus trained were sent to the United Kingdom for posting to field units of the new armies as they were mobilized. This measure of including serjeants, A.V.C., in the establishments of

field units was begun tentatively and of necessity at a time of great emergency, but it was ultimately found to be of the greatest value to the army in the field.

It should be emphasized that it was due to training that success was obtained. The immense advantages of modern scientific methods are well exemplified in the training of men in first-aid duties. The principles of first-aid treatment and preventive medicine have been made so clear and simple that they are quickly grasped by a mind of average intelligence. In former days, when causes were dimly perceived or entirely unknown, and when consequently much of the effort to combat disease was empirical, it was not easy to impart useful instruction for the purposes of training. The useful part of veterinary work at that period was a skilled manual dexterity which could only be acquired with difficulty. Now, however, empiricism has given way to science, and rule-of-thumb methods have been replaced by scientific principles. These are the reasons why it was found possible during the war to carry out the training in technical duties of such large numbers of men.

Approval was obtained in 1916 for the appointment of one executive veterinary officer to each army and corps headquarters. At the same time the following reductions of establishments were made :—

- (a) Appointments of executive veterinary officers with reserve parks and bridging trains were abolished.
- (b) The appointment of an executive veterinary officer with each heavy artillery brigade was abolished. Instead, one officer, A.V.C., was posted for duty with the heavy artillery.

In the spring of 1917 sanction was given for the appointment of officers, A.V.C., for administrative duty with each corps headquarters; these appointments required eighteen officers. About the same time part of the artillery of divisions was absorbed in the new organization of army field artillery brigades.

In consequence of this re-organization and of the shortage of executive officers created by the increase in administrative appointments, it was found necessary to reduce veterinary officer establishments with an infantry division to the following :—

Deputy Assistant Director of Veterinary Services.

Three Executive Veterinary Officers.

Officer Commanding Mobile Veterinary Section.

With this reduced establishment it was found necessary to utilize the services, as far as practicable, of the officer commanding the Mobile Veterinary Section for executive work with the division. At the same time, a staff-serjeant was added to the establishment of the Mobile Veterinary Section in order to relieve the O.C. of routine and non-professional duties.

The final changes occurred in 1918, and were as follows :—

- (a) Veterinary evacuating stations (one for each corps) were formed.

- (b) The establishment of officers with a veterinary hospital for 2,000 patients was reduced from nine to six (excluding the quartermaster).
- (c) The establishment of officers, A.V.C., with cavalry brigades was increased from one to two.
- (d) An officer, A.V.C., was added to the establishments of the following :—
 - Cavalry divisional headquarters.
 - Headquarters cavalry corps.
 - Advanced horse transport depot.
 - Havre area.
 - Rouen area.
 - Abbeville and Amiens area.
 - Calais and Dunkirk area.
 - Marseilles base (and embarkation duties).

There were no further changes, and it is probable that a certain degree of finality was reached. It seems likely that, even if the war had continued longer than it did, there would not have been much further modification of veterinary establishments so long as the conditions generally remained those of trench warfare. Four years of practical working in the field went to the construction of the ultimate organization, and at the end of that time most of the weak links had been discovered and eliminated.

So far as officers, A.V.C., were concerned, the establishment was, on the whole, about 35 per cent. less than the accepted basis before the war ; but, as already stated, this circumstance was considerably discounted by the addition to establishments of the serjeants, A.V.C., with field units.

A more important matter than numbers was the incapacity, through age or bad health, of a considerable proportion of the officers, so that many were unfit to perform fully the duties of an executive officer in the field. This was a serious handicap. Appendix B III is a reprint of a pamphlet which was issued to all veterinary officers on first joining and gives some idea of their many responsibilities.

Section IV.

Evacuation of Sick and Wounded Animals.

The reasons for the evacuation of sick and wounded animals are the same as those for the evacuation of sick and wounded men ; briefly they are :—

- (1) Humanity.
- (2) Efficiency.
- (3) Economy.

It is essential that fighting formations should not be hindered and impeded by retaining accumulations of sick animals, and it is equally essential that sick animals should receive modern scientific attention so as to ensure that as few as possible are lost. The mobile veterinary section provided the best practicable means of fulfilling

these conditions by keeping in touch with fighting formations in order to collect their sick and wounded animals and conduct them to veterinary hospitals on the lines of communication. Mobile veterinary sections had not been used in former wars, but their functions and utility had been tested and observed in army manoeuvres for some years, so that there was no doubt about including these units in the original British Expeditionary Force. The war establishment of a mobile veterinary section in August, 1914, comprised one officer and ten other ranks. These units were allotted to the original Expeditionary Force at the rate of one for each cavalry brigade and infantry division.

Reference has already been made to the small use that could be made of mobile veterinary sections during the opening phase of the campaign. Added to this restriction of function for purely military reasons, there was a further impediment in the fact that these units were at first under the orders of the Inspector General of Communications. They were thus, as a rule, too far from their headquarters to receive instructions or information.

It was, in short, a state of affairs in which it occasionally happened that only the resource and initiative of the commanding officer saved a mobile veterinary section from losing its way and being captured by the enemy. The same initiative was displayed as soon as the retreat was ended in the collection and evacuation of strayed and abandoned animals, in addition to those which were evacuated by units in the orthodox way.

As soon as possible the following changes were made :—

- (a) Mobile veterinary sections became divisional units, under the orders of the divisional commanders.
- (b) The war establishment was increased by fourteen other ranks (including a shoeing-smith) for horse-keeping duties. Additional transport was also obtained. The old establishment provided only a nucleus of N.C.Os. and dressers, the idea being that personnel for horse-keeping duty were to be obtained by hiring civilian labour. It was soon found that this arrangement was impracticable, and that consequently it was necessary to increase the establishment to one officer and twenty-four other ranks. As already stated a staff-serjeant was subsequently added.

When the veterinary evacuating station came into being the establishment of the infantry divisional mobile veterinary section (as will be seen later) was reduced to one officer and eighteen other ranks by the transfer to the former unit of the staff-serjeant and six rank and file. The personnel of the cavalry mobile veterinary section was not affected and remained at one officer and twenty-four other ranks.

Channels of Evacuation.

The normal channel was rail, though barges and roads were also used. The ordinary procedure was for the officer commanding a

mobile veterinary section to arrange with the railway transport officer of the railhead concerned to load the animals in trucks of empty supply trains returning to the base. This was an arrangement which is more easily described than carried out.

During the operations on the Somme in 1916, arrangements were made by the railway authorities to run complete sick-horse trains on certain days of the week. This was a most satisfactory plan. The journey was made in a much shorter time than when trucks were included in a mixed freight train; in the latter circumstance many delays occurred through halts for uncoupling and shunting.

The evacuation of sick animals by means of barges was practised as far as possible on some of the canals in Flanders. Journeys by barge were ideal in all weathers for sick horses, there being none of the vibrations or shocks experienced by rail.

Two types of barges were specially fitted up by the Inland Waterways Transport Service for the evacuation of animal casualties during the final advance of the allies in the autumn of 1918. The general arrangements, construction, and fittings, were as follows:—

Type "A."—The hold measured 30 ft. by 8 ft., low sided; one end could be let down to off-load to a bank or shore. They were difficult to steer. The horses could be fed from the raised narrow deck around the edge.

Type "B."—The hold measured 52 ft. by 15 ft. The animals embarked and disembarked by an inclined wooden ramp up to deck level. The ramp then turned at right angles, and by a gangway to the shore in the form of a detachable bridge carried the animals on board. The ramp was cross-battened with half-round fir poles. This type accommodated twenty-five horses, arranged cross-wise and secured to adjustable light hawsers, breast-high, detachable to admit of the front row being first packed in, tails forward, leaving space for hay-nets, etc. This was the type in common use and rendered the most satisfactory service. The floor was of iron and was cross-battened with half-round fir logs.

Feeding on the barges was usually with hay only, which was served in hay-nets and pulled along a wire over the horses' heads.

Watering was equally simply carried out by a bucket dipped into the canal. One or two men for each barge were the only necessary personnel required for all purposes. A special space was reserved for two lying down cases and one sling case.

Evacuation by road, except for animals entirely unable to walk, was of course necessary for part of the journey, whatever might be the other means of transit. The complete use of roads for purposes of evacuation was regularly practised only from the area of the Second Army to No. 23 Veterinary Hospital at St. Omer. On this route a chain of halts was established for the accommodation of convoys which could not complete the journey in one day.

Horse Ambulances.

Experience in army manoeuvres before the war had shown the need for horse ambulances. The evidence in favour of the provision of these vehicles became overwhelming during the early months of the war. The need was temporarily met, when possible, by the hire or purchase of suitable vehicles from the civil inhabitants for use of mobile veterinary sections. Official approval was given in November, 1915, for the issue of a light horse ambulance, or "float," to each mobile veterinary section with an infantry division. The war establishment of the unit was amended by the substitution of this vehicle for a G.S. limbered wagon. The issue was restricted to mobile veterinary sections with infantry divisions. It was considered that the horse ambulance was a type of vehicle which was not adapted for rapid movement, and should not therefore be included in the wheeled transport of a mobile veterinary section with a cavalry brigade. Subsequently, however, in the exceptional circumstances of trench warfare, sanction was given for the use of one horse ambulance with each cavalry division. Only horse-drawn ambulances were included in the transport of mobile veterinary sections. In addition to these vehicles, however, there were several motor-driven horse ambulances (presented by the R.S.P.C.A.) which were largely used by veterinary evacuating stations and at ports of disembarkation.

Advanced Collecting Posts.

It was thought that the evacuation of animals which became casualties during an offensive might be facilitated if small dressing stations were interposed between the mobile veterinary section and the firing line. This arrangement was tried on many parts of the battle front, but the results were often disappointing. An advanced collecting post, to be of any use, must comprise a N.C.O. and three men, and this personnel must, as a rule, be found from the establishment of the mobile veterinary section, which is too small to bear this depletion without loss of efficiency. In a war of movement, however, when the position of the railhead may be far to the rear of the fighting line, much use might be made of the principle of advanced collecting posts.

It sometimes happened during the war (notably in Italy) that advanced collecting posts were, in fact, established in circumstances like those just described, and then proved useful.

Veterinary Evacuating Stations.

These units, which came into being for the first time during the war, had their origin in a temporary unofficial formation known as "corps mobile veterinary detachments."

During the operations on the Somme mobile veterinary sections

were unable to keep pace with the number of casualties to be evacuated, owing chiefly to the following circumstances :—

- (1) Large increase in the numbers of animals with corps troops.
- (2) Unavoidable delay in the return from veterinary hospitals of conducting parties of mobile veterinary sections.

Consequently, it was decided to make a trial of a formation, termed a corps mobile detachment, whose functions were to be :—

- (1) Those of a mobile veterinary section for corps troops.
- (2) Those of a casualty clearing station in relief of the divisional mobile veterinary section in the duties of entraining and conducting animals.

Personnel were provided for these improvised corps mobile veterinary detachments as follows :—

- (a) The commanding officer was the executive veterinary officer on the establishment of corps headquarters.
- (b) One serjeant, one corporal and six privates were found by the mobile veterinary sections of the divisions in the corps.
- (c) The remaining subordinate personnel (twenty to thirty privates) for conducting duty were obtained from the lines of communication as required.

It should be made clear that the corps mobile veterinary detachment, or, as it subsequently became, the veterinary evacuating station, assumed the entire function of entraining and conducting sick animals to the base, a function which had hitherto been solely exercised by the mobile veterinary section. Consequently the mobile veterinary section could properly be called upon to provide from its establishment the personnel necessary for a function of which it had been relieved.

In 1918 the trial of the temporary corps mobile veterinary detachments had, it was considered, fully proved the utility of these formations. Official sanction was accordingly given to the establishment of similar units, to be known as veterinary evacuating stations, on the condition that the necessary personnel was found from existing establishments.

The establishment of a veterinary evacuating station was one officer and thirty-eight other ranks. Each infantry divisional mobile veterinary section provided a staff-serjeant and six rank and file as its contribution towards the personnel of the veterinary evacuating station, the establishment of the former unit being amended accordingly. The remainder of the personnel was drawn from veterinary hospitals on the lines of communication. It was decided that veterinary evacuating stations should be included in army troops and be allotted to corps as the military situation required. The normal allotment was at the rate of one for each corps, and the number of veterinary evacuating stations formed was eighteen, including two which were formed by the dominion forces. Each veterinary evacuating station was equipped

with a motor-driven ambulance. These vehicles were presented by the Royal Society for the Prevention of Cruelty to Animals, and were of great assistance in providing a means for the rapid evacuation of serious cases.

During the preliminary period of a large offensive operation it was found necessary to evacuate all sick and injured animals from the mobile veterinary sections and veterinary evacuating stations of formations concerned in order that they could deal with a large number of casualties. It was also found necessary to reinforce these units from veterinary hospitals with subordinate personnel for the purposes of all train conducting duties. The normal establishment of mobile veterinary sections and veterinary evacuating stations was insufficient to meet the exceptional circumstances of a big offensive when large numbers of casualties had to be evacuated in a short time.

When the cavalry corps was engaged in an offensive operation, it was necessary to make special arrangements for the evacuation of their sick and injured animals by grouping the mobile veterinary sections of a cavalry division in echelon instead of allowing them to serve independently with their cavalry brigades. These special arrangements had to be made because the cavalry corps had not a veterinary evacuating station, and it was not often possible to utilize the services of the veterinary evacuating station with the nearest army corps.

From August, 1914, to January, 1919, half a million sick and injured animals were collected and conveyed by mobile veterinary sections and veterinary evacuating stations to veterinary hospitals on the lines of communication.

The time during which it was possible to make trial of veterinary evacuating stations was cut short by the armistice. It must be remembered, however, that their predecessors, the unofficial corps mobile veterinary detachments whose function was similar, had been at work long before the veterinary evacuating stations were formally established.

Section V.

Veterinary Hospitals and Convalescent Horse Depots.

(a) Veterinary Hospitals.

The six veterinary sections, each for 250 patients, which formed the sole veterinary hospital establishment of the original expeditionary force, were located as follows :—

Nos. 1 and 2	..	Havre.
„ 5 and 6	..	Rouen.
„ 7 and 8	..	Amiens.

At the end of August, 1914, when for strategic reasons the lines of communication were moved to the south of the Seine, the following changes were made :—

Nos. 1 and 2	..	to St. Nazaire
„ 5 and 6	..	„ Nantes.
„ 7 and 8	..	„ Le Mans.

The sections at Le Mans then received all animals evacuated from the Marne and Aisne, but by the middle of September the numbers received were so great, and the losses due to long railway journeys were so serious, that an advanced veterinary hospital was established at Villeneuve St. Georges, south-east of Sens. Two officers and forty-three other ranks were provided from No. 1 Veterinary Section for the purposes of this advanced hospital. The number of patients soon exceeded 2,000. The personnel was temporarily increased by the loan of 200 R.A. reinforcements, but it was very evident, both here and elsewhere, that more definite and comprehensive arrangements must be made if the Army Veterinary Services were to be of any material assistance so far as veterinary hospital accommodation was concerned.

It may be observed here that the original six veterinary sections provided veterinary hospital accommodation only for $1\frac{1}{2}$ per cent. of the animal strength of the Expeditionary Force, whereas at military stations in peace the hospital accommodation for sick and injured animals was, and is, allowed on a 6 per cent. basis of the animal strength. A veterinary section for 250 patients was found to be quite inadequate for the purpose of a veterinary hospital in the circumstances of a great European war. Consequently, approval was sought and obtained on November 11th, 1914, for the establishment of veterinary hospitals, each for 1,000 patients.

When the lines of communication were again removed to the north of the Seine, the veterinary sections, then for the first time designated veterinary hospitals, were also moved and located as follows :—

No. 1 Veterinary Hospital, La Chapelle-aux-Pots.			
„ 2	„	„	Havre.
„ 5	„	„	Abbeville.
„ 6	„	„	Rouen.
„ 7	„	„	Forges-les-Eaux.
„ 8	„	„	Forges-les-Eaux.

All were in process of being brought up to the newly-sanctioned war establishment of a veterinary hospital for 1,000 patients.

Veterinary hospitals did not by any means immediately become serviceable and adequate places for the reception and treatment of sick and injured animals. The former war experience of the army veterinary service was restricted to dry, hot countries. Very little practical knowledge was available of the means to be taken to secure dry standings, overhead cover, and serviceable roads. Properly, of course, these are engineer and not veterinary problems, but in effect they became veterinary problems. It is doubtful indeed whether anyone fully foresaw the need for dry standings in the veterinary hospitals until the absence of this first essential in northern France made itself distressingly and evidently felt. Hardly any stabling was available, except at La Chapelle-aux-Pots and Abbeville, where it was found possible, by adapting a number of brick sheds,

to provide a quantity of good accommodation. Winter was at hand and, except as stated, there was no protection against mud and rain. Sanction had been given, it is true, for the erection of stabling for all the hospitals that required it, but nothing much could be done in this respect during the first winter. At this critical juncture an opportunity occurred of purchasing several large circus tents; the opportunity was promptly taken, and much was done thereby to relieve an anxious and difficult situation.

The problem of dry standings received intense consideration. Every possible expedient was tried in the long battle with mud and the diseases and inefficiency which result from animals being kept standing in mud. Bricks and wooden blocks were mostly used. Where they could not be obtained, standings were improved by embedding wood, straw, peat moss, ashes, etc., in the mud. The veterinary hospital later located at Neufchatel, Pas-de-Calais, on the sand-dunes, fared best in this respect.

The opinion of those who had to grapple with the difficulties of the first winter was that, of the two evils, it might be better to have no overhead cover than no underfoot standings.

The first additional veterinary hospitals sent from the United Kingdom arrived in the middle of October, and were :—

No. 9 Veterinary Hospital, located first at Abbeville and later at Dieppe.

No. 10 Veterinary Hospital, located first at Abbeville and later at Neufchatel.

In November and December, 1914, the Indian expeditionary force arrived, bringing eight Indian field veterinary sections, each for 250 patients. In March, 1915, the Canadian veterinary hospital (established for 500 patients) arrived in France. During 1915 the following veterinary hospitals were mobilized in the United Kingdom and sent to France to meet the ever-growing needs of the Expeditionary Force :—

Veterinary Hospitals	Nos.	3	} each for 1,000 patients.
"	"	4	
"	"	12	
"	"	13	
"	"	14	
"	"	19	} for 1,250 patients.
"	"	22	

Early in 1916, No. 23 Veterinary Hospital for 1,250 patients was mobilized and formed at St. Omer by means of drafts from the United Kingdom.

In May, 1915, sanction was given for the grouping of the eight Indian field veterinary sections in two hospitals, located at Rouen and Marseilles, with an establishment expanded at each place to deal with 1,000 patients. The establishments were completed with European personnel. When the Meerut and Lahore divisions

went to Mesopotamia in December, 1915, two of the Indian field veterinary sections accompanied them. The deficiency was made up by increasing the number of European personnel at Rouen and Marseilles.

The necessity of having a definite policy in the matter of meeting the ever-increasing requirements of the force for veterinary accommodation was felt early in the campaign. In this respect, the following decisions were taken early in 1915 :—

- (a) That veterinary hospital accommodation should be on a basis of 10 per cent. of the animal strength of the force, of which 7 per cent. should be allocated to veterinary hospitals and 3 per cent. to convalescent horse depots.
- (b) That increased accommodation should be provided rather by expanding existing veterinary hospitals than by establishing new centres in lines of communication, which were already taxed to their utmost in the matter of affording sites and facilities for transport.

The estimated percentage of veterinary accommodation was reduced in November, 1915, from 10 per cent. to 8 per cent. ; but even on this basis the rapid increase in the animal strength of the force necessitated expansion of veterinary hospital accommodation. The step first taken in the expansion of existing establishments was the amendment of the war establishment of a veterinary hospital from that of a hospital for 1,000 patients to that of one for 1,250 patients. This change was sanctioned for inclusion in official war establishments in December, 1915.

During 1916, the following additional veterinary hospitals arrived from the United Kingdom :—

No. 24 Veterinary Hospital.

„ 25	„	„
„ 27	„	„

These hospitals were split up and the personnel was distributed by double subdivisions among the following veterinary hospitals, each of which then became capable of dealing with 1,500 patients :—

Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 19, 22, 23.

In January, 1917, sanction was given finally for the establishment of a veterinary hospital in France to be capable of dealing with 2,000 patients. This increase was rendered necessary by the expansion of the strength of the force to seventy divisions (including five cavalry divisions) and the abnormal sick rate then prevailing. Just as Nos. 25 and 27 Veterinary Hospitals were split up on their arrival in France, so the personnel of Nos. 28 and 29 Veterinary Hospitals from the United Kingdom were similarly divided among the existing veterinary hospitals in France to provide the personnel required to complete the increased establishment of veterinary hospitals for 2,000 cases. Much unnecessary work in mobilizing these units would have been spared if the ultimate effect of the policy of increase by expansion could have been foreseen.

The personnel of one subdivision of No. 4 Veterinary Hospital at Calais was provided by the New Zealand Government from the New Zealand Veterinary Corps.

Early in 1917 the Australian Veterinary Hospital for 1,250 patients was established at Coquelles, near Calais. About the same time, No. 24 Veterinary Hospital, which on its first arrival in France had been split up (see above), was now re-formed as a veterinary hospital for 2,000 patients on the race-course at Gournay-en-Bray. The highest point of veterinary accommodation was now reached ; consequently, the question of how further requirements should be met, whether by expanding still further existing establishments or by adding to the number of units, did not arise. It seems likely, however, that a veterinary hospital for 2,000 cases is the largest unit of its kind which can be properly controlled in the field.

Many changes were subsequently made to meet the fluctuations in the animal strength that resulted from transfers of combatant units to and from other expeditionary forces. For instance, in the autumn of 1917 the remaining six Indian field veterinary sections departed with the 4th and 5th Cavalry Divisions to Palestine. This personnel was replaced by that of Nos. 15 and 30 Veterinary Hospitals from Salonika. Nos. 1 and 22 Veterinary Hospitals were re-formed on the war establishment of a veterinary hospital for 1,250 patients and sent to Italy for duty with the expeditionary force on that front.

For a long time the rank of the commanding officer of a veterinary hospital for 2,000 patients remained that of major with additional command pay of 5s. a day ; but ultimately, sanction was given for the rank of lieutenant-colonel on condition that the command pay was reduced to 2s. 6d. a day. At the same time, sanction was given for the officer appointed second-in-command to have the rank of major.

As far as possible, the veterinary hospitals on the lines of communication were organized to work in groups, each comprising :—

- (a) A reception hospital.
- (b) A mange hospital.
- (c) One or more general hospitals.

Each group received its patients from an allotted portion of the front line, so that it was usually possible to anticipate to some extent a rush upon a particular group and to prepare for it by transferring as many as possible of its patients to veterinary hospitals of other groups. Patients arriving from the front line were first admitted to the reception hospital of the group, where the necessary classification of their requirements was made before they were allocated to the appropriate hospital of the group for treatment. Some system of this kind was found to be necessary. So large an organization could not have been controlled or used to advantage without some effective means of co-ordination.

The enemy offensive and temporary advance in the early part

of 1918 necessitated the following changes in veterinary organization :—

- (a) Evacuation of the veterinary hospital accommodation at Auneuil, near Beauvais (annexe of No. 24 Veterinary Hospital).
- (b) A large portion of No. 1 Convalescent Horse Depot at Gournay-en-Bray was handed over to the French military authorities for the accommodation of their troops.
- (c) Nos. 7 and 8 Veterinary Hospitals at Forges-les-Eaux and most of No. 24 Veterinary Hospital at Gournay-en-Bray were partly evacuated by road to Havre and Rouen.
- (d) Sites south of the Seine suitable for veterinary hospitals were selected for occupation should a general withdrawal become necessary.

When the military situation again changed in favour of the allies during the summer of 1918, work was resumed at Nos. 7 and 8 and 24 Veterinary Hospitals. In the north, the continuous bombing of St. Omer during the enemy offensive interfered with the work of No. 23 Veterinary Hospital which was located in the French Artillery Barracks there. Consequently, the number of patients was reduced to 500, and the surplus personnel was distributed among other hospitals. The allied advance towards the end of the campaign, with the consequent great increase in the length of the lines of communication, made it necessary to arrange for veterinary hospital accommodation in the forward area. Accordingly, in December 1918, half of No. 15 Veterinary Hospital at Rouen and No. 2 Advanced Depot of veterinary stores were moved to Charleroi where they were accommodated in the Belgian Cavalry Barracks.

In January, 1919, the question of the provision of veterinary hospital facilities for the British forces in Germany was taken up. At first the basis of animal strength of the Army of Occupation was 86,000 animals with field army units and 5,160 remounts. This was subsequently modified.

To serve this force it was contemplated to arrange for three veterinary hospitals of 2,000 patients each to be located at Cologne, Duren, and Bonn respectively, and a fourth for 2,500 cases at a place to be determined and one base veterinary store, and a veterinary bacteriological laboratory at Cologne. The organization and administration were to be independent of the B.E.F., France.

The D.V.S., B.E.F., France, inspected proposed sites in the neighbourhood of Cologne, Euskirchen and Duren.

No. 8 Veterinary Hospital arrived on March 2nd, 1919, from France (Forges-les-Eaux) and was located at Marienburg in the enemy fort No. 8 of the outside belt of the Cologne defences. The necessary internal reconstruction allowed the accommodation of a proportion of the personnel and the stores of the advanced depot of veterinary stores. In the environment of the fort certain temporary wooden buildings were re-arranged for the remainder of the personnel and offices, a recreation room and gymnasium. In the close vicinity

stables were erected from material which had been obtained from the dismantled stables of veterinary hospitals in France; the actual erection was carried out by the R.A.V.C. under R.E. supervision. Sick animals reached the hospital by road convoys from the veterinary evacuating stations and mobile veterinary sections, and by rail to Cologne (Eifel Tor Station). The veterinary hospital was pressed to receive patients before its arrangements were complete to avoid rail transit to France.

The construction of this hospital was carried out under difficult conditions which differed from those in France, and involved the employment of labour from enemy ranks, or prisoners of war, and civilians, none of whom was of good physical fitness. All efforts were made to utilize and adapt material and stores captured from the enemy. Close at hand lay brick factories at the time unworked, and not far distant were works for making concrete blocks, the latter being most suitable for the stable floors. The acceptance of cases could not be deferred until flooring was laid down, and many cases were treated on outside lines through the most inclement weather of January and February. This is yet another instance of the value of a tented veterinary hospital when it is expected to receive cases almost at once.

No. 24 Veterinary Hospital (2,000 cases) was moved from Gournay (France). April 12th, train in position 9 a.m., all loaded by 12 noon—moved out at 14.38 hours. Reached Cologne 12 noon April 14th.

The personnel of this hospital comprised a proportion of transfers during March, 1919, from No. 5 Veterinary Hospital. The site chosen was at Marienburg, Cologne, near an old enemy ammunition dump and factory, which were adapted for accommodation of the personnel and for dining and recreation rooms. Subsidiary buildings, e.g. cook-houses, and ablution and bath arrangements were built specially. The animals were at first picketed in open lines, but later in the portable iron stables sent up from Abbeville for 50 per cent. of the total accommodation. The stables were laid out in blocks of four, each block accommodating a total of 250 animals, forming thereby one subdivision, self-contained with water troughs, manure pits, and forage. The offices and stores were in temporary existing wooden buildings.

Owing to the reduction of the animal strength by the demobilizing of more divisions the hospital was used chiefly as an animal collecting camp in the scheme for distribution of the animals for sale or for transfer to France or to the United Kingdom. Often 500 animals were admitted and 500 others discharged in a single day. They were dealt with on the basis of subdivisinal arrangements. The animal strength during the summer of 1919 often exceeded 2,000. The arrangements worked quite smoothly.

(b) *Convalescent Horse Depots.*

The object of a convalescent horse depot, as distinct from a veterinary hospital, is to provide maintenance at less cost than that

of a hospital for animals which no longer require medical or surgical treatment but need conditioning before being discharged to a remount depot. The first convalescent horse depot was formed in September, 1914, at Gournay-en-Bray in good grass land, divided into small fields, well watered and fenced, for the most part, with stout hedges. It was organized for 4,000 animals. Eleven hundred and eighty hectares of grazing were hired at an average cost of 23 francs per hectare per month. In addition a certain amount of stabling was acquired by hiring the premises of a local creamery and unoccupied farm buildings. The design was to run the animals at grass, and periodically to select and bring into the stables the fittest among them to be cleaned up before issue to the remount department.

One thousand one hundred and eighty hectares are equivalent to 3,000 acres, so that on an establishment of 4,000 animals there was an allowance, approximately, of three-quarters of an acre for each horse. The depot was divided into areas, each controlled by an officer who in his turn subdivided his charge into groups. Each group was supervised by a senior N.C.O., assisted by the allotted number of junior N.C.Os. They were billeted in houses near the fields of which they had charge, and were responsible for the watering, feeding and care of the animals allotted to them. The grazing was supplemented by a small oat ration, which was dumped by the Army Service Corps at certain points and distributed by the transport of the unit.

This arrangement worked well while the summer grass lasted, but when this was all eaten many difficulties arose. An increased oat ration and hay were given, but by the end of November the pastures were cut up so badly that it was no longer possible to cart forage through the bogged entrances into the fields. Losses became serious, and it was unmistakably evident that a change of policy must be made. Consequently, arrangements were made to evacuate the debilitated animals to veterinary hospitals and to bring those that were still fit under cover, which was provided by hiring extra stabling and shelters in the vicinity. No further attempt was made to run large numbers of horses at grass during the winter months, and no animals were left at grass after November 15th.

The subsequent organization of the depot was that of a grazing ground for 4,000 horses during the summer months, and a winter quarters under cover for 1,200 animals during the winter months. These arrangements were carried on throughout the war.

Three other convalescent horse depots were formed in 1917 and located as follows:—

No. 2 Convalescent Horse Depot, Dannes.

„ 4 „ „ „

„ 3 „ „ „ Neufchatel.

These units were organized on a new establishment of three officers and 128 other ranks to deal with 1,200 patients. They were worked on a system of open sheds and kraals on sites specially selected for their sandy soil and natural facilities for drainage.

The arrangements therefore corresponded, as far as possible, with those of a convalescent horse depot in a hot, dry country such as Egypt or South Africa, where the conditions generally are more suitable for this means of dealing with convalescent animals.

The economic objections from a veterinary point of view to a convalescent horse depot in northern Europe are chiefly that adequate professional supervision cannot well be exercised in circumstances of rain and mud over large numbers of unfit animals run together in mobs. The advantage gained in cheap accommodation and a small establishment of personnel may be discounted by loss of working time of animals which, under the closer supervision of a veterinary hospital, would be sooner discharged to duty or disposed of in other ways.

Section VI.

Bacteriological Diagnosis.

In army areas all Assistant Directors of Veterinary Services were equipped with small field microscopes, etc., including a $\frac{1}{2}$ inch oil immersion lens. Deputy-Assistant Directors were similarly equipped, but had no oil immersion lens. In actual practice the equipment was, as a rule, carried by the O.C. Veterinary Evacuating Station and O.C. Mobile Veterinary Section respectively.

Elementary microscopical work, such as the examination of skin scrapings, was done by divisional arrangement ; more exhaustive investigations were carried out at the veterinary evacuating station. When there was a suspicion of serious contagious disease, specimens were also sent to the Officer i/c A.V.C. Bacteriological Laboratory, Rouen, for confirmation. On the lines of communication, in addition to the laboratory at Rouen, each group of veterinary hospitals was provided with a small laboratory for diagnostic work.

It was found that the arrangements made in army areas were not always satisfactory and were probably not economical or profitable. The cost of so many microscopic outfits was not small, and, as a rule, useful microscopic work can only be done by a specialist. Such routine work as the examination of skin scrapings or other simple diagnostic procedure may to some extent be replaced in the actual field by clinical methods, and the really essential business of research can only be carried out by an expert in a properly equipped laboratory.

A system which assumes that every administrative veterinary officer is a skilled bacteriologist, and demands from him at least the appearances of that qualification, tends to increase unproductive work and to interfere with useful duties. The general experience of laboratories shows that the value of bacteriological work is dissipated by distribution, and that very little of real value is accomplished by first-aid microscopic outfits. Complete equipment under relatively stationary conditions, and the opportunity for conference and co-operation between specialists, seem to be the primary essentials if any useful results are to be obtained from scientific work in this respect.

The plan of sending specimens from units in army areas to a laboratory on the lines of communication led to many delays and considerable disappointment when a quick decision was required. It has been suggested that a veterinary bacteriologist should be added to the establishment of an army in order that delays of this character may be obviated. This measure would to a great extent ensure the speedy diagnosis of zymotic disease, and would contribute considerably to the success of research work. Research is primarily the business of the veterinary laboratory at the base or on the lines of communication of the force, but the results obtained depend largely upon the evidence supplied by trained scientific workers in the field.

There is no doubt that veterinary research during the war was handicapped by its lack of scientific contact with conditions at a distance from the laboratory which was established on the lines of communication. Field army laboratories would have filled the gap.

Section VII.

Accounting for Animals.

A heavy and harassing part of the clerical work of the Army Veterinary Services was that of accounting for animals in accordance with the agreements entered into between the Imperial Government and the Canadian, Australian, New Zealand, South African, and Portuguese governments, in the matter of payment for remounts provided by the Imperial Government. The Imperial Government supplied animals either at a flat rate or at prices fixed for each class of animal, e.g. heavy draught, rider, etc., and the cost was debited to the purchasing government. When an animal that had thus become the property of a purchasing government fell sick, it was handed back to the Imperial Government who, in fact, repurchased it, in its ineffective state, at a figure based on the original selling price less a percentage calculated from the number of such animals that died or had to be destroyed or sold. This system could only be carried out accurately if every animal admitted to the care of the army veterinary services from the governments in question was accounted for separately. This of course was impracticable on active service. Throughout the war a monthly statement of animals evacuated from the units concerned was prepared by the veterinary service and compared with similar statements compiled by the Dominion Forces and Portuguese Government. The statements differed so widely that agreement of actuarial grounds was impossible and the ultimate adjustment was necessarily in the nature of a compromise, which was only effected after months of correspondence. The correspondence, indeed, was enormous and occupied the time of several officers who should have been, and otherwise would have been, available for productive duties.

Section VIII.

Veterinary Equipment and Stores.

No. 1 Base Depot and No. 1 Advanced Depot of Veterinary Stores arrived in France with the original British Expeditionary Force, and were established in due course at Havre and Abbeville respectively. They held a three months' supply of stores. Early in 1915, No. 2 Base Depot and No. 2 Advanced Depot of Veterinary Stores were established at Calais. During the operations on the Somme in 1916, No. 3 Advanced Depot of Veterinary Stores was formed and installed at Romes Camps. The supply of veterinary stores and field veterinary equipment for the expeditionary force was maintained by means of these depots, which in their turn were kept supplied from the Army Veterinary Stores at Woolwich.

During the first fifteen months of the campaign the administrative veterinary officer of a division or other formation compiled a list of the requirements of his formation and indented for them in bulk. The supplying depot, which received the indent, then prepared the stores and handed them over to the next conducting party from the Mobile Veterinary Section of the formation concerned for conveyance to their destination. In October, 1915, this system was modified to meet the more settled conditions of trench warfare. The new system was that administrative veterinary officers no longer compiled the list, but that executive veterinary officers prepared indents for their own requirements and passed them to their administrative headquarters for counter-signature and transmission to the depot of veterinary stores which supplied the sector concerned. The depot then despatched the stores to the indenting officer through the military forwarding agency. Indents that included exceptional demands, whether of kind or degree, were referred to the Director of Veterinary Services. Demands for stores to replenish the stocks held in base depots were submitted monthly, and supplies were received monthly from the Army Veterinary Stores at Woolwich. Some items, such as chloroform and mallein for the palpebral test, which were difficult to obtain in the United Kingdom or were cheaper in France, were purchased locally.

Careful measures were taken in supervision and accounting in order to prevent the waste and misuse of veterinary material. Officers and N.C.Os. who held equipment on personal charge were made to pay for deficiencies which they could not satisfactorily explain.

Stores to the value of nearly £6,000 were supplied on repayment to the French, American and Portuguese Forces.

Section IX.

Instruction in Farriery.

It was necessary at an early stage of the campaign to take steps to increase the supply of trained shoeing-smiths. At first it was only possible to arrange hurried courses in cold-shoeing. These courses were started early in 1915 at G.H.Q. under the control of

the Army Service Corps. They were carried out in a forge which adjoined the G.H.Q. sick-horse lines, and lasted only fourteen days. In September, 1915, owing to an outbreak of glanders in the 26th Company Army Service Corps, it became necessary to suspend work at this temporary School of Farriery. The following proposals were then made :—

- (a) That the school should be located elsewhere than at G.H.Q. because the number of animals there was limited, and because if G.H.Q. were moved the instruction would be interrupted.
- (b) That the instruction ought to be, for technical reasons, under the control of the Army Veterinary Services.

These proposals were adopted, and the school was consequently moved to Abbeville and attached to No. 5 Veterinary Hospital. The establishment then comprised :—

A Chief Instructor.

Five Assistant Instructors.

Thirty pupils in training.

The training was carried on under canvas at Abbeville until January, 1916, when the buildings specially constructed for the accommodation of the school were completed. The formation was then attached to No. 22 Veterinary Hospital.

Towards the end of 1916, the buildings were enlarged to an extent that made it possible to train, at any one time, 234 British and 26 Indian personnel. The School of Farriery became a separate unit on December 24th, 1916. N.C.Os. and men were sent by the armies and the cavalry corps to be trained in cold and hot-shoeing. The length of the course for cold-shoers was two months ; for shoeing-smiths, from four to six months. The school was divided into thirty-six classes, each comprising one assistant instructor and five men. The remainder of the pupils whose training was advanced were given practical experience in the forges of Nos. 5, 14 and 22 Veterinary Hospitals.

New classes began each month. The Director of Veterinary Services controlled the allotment of vacancies to the various formations. Pupils were made acquainted with the structure of the foot and the rudiments of shoeing by preliminary work on the feet of dead horses. As their knowledge grew, they were arranged in classes and put to work on the living subjects. They then passed through more advanced classes until, at the end of a month, they were distributed among the forges of the above mentioned veterinary hospitals for practical experience. They were ultimately brought back to the school for a final period of instruction of eight days, ending in an examination by a board of veterinary officers, and it is recorded that the proportion of candidates who passed this examination was 99 per cent. Each assistant instructor was provided with a section of a horse's foot for the purpose of giving additional instruction in theory after the actual shoeing was finished.

There was a lecture room attached to the school where numerous diagrams were displayed and shoes of all descriptions could be seen.

Lectures were given on the anatomy of the foot, and each man joining the school was given a pamphlet entitled "Points to be remembered in shoeing." The average number of shoes removed and new shoes put on each day was 576.

Owing to the establishment in the United Kingdom of three large schools of farriery, it was decided by the Army Council in July, 1918, that it was no longer necessary to carry out training at the school at Abbeville; consequently the school was closed down in August, 1918.

The following numbers of men qualified at the school up to the time of its being closed down in August, 1918:—

British personnel	..	..	..	2,353
Indian personnel	..	..	..	181
Total	..	..	..	<u>2,534</u>

The establishment of the school in March, 1918, was:—

Officer	..	..	..	..	1
Warrant officer	..	..	..	..	1
Farrier Quartermaster-serjeants	..	..	..	..	3
Farrier staff-serjeants	..	..	..	..	8
Farrier serjeants	..	..	..	..	25
U/P serjeant-clerk	..	..	..	..	1
"P.U." and "P.B." men	..	..	..	..	9
Indian personnel	..	..	..	..	5
Total	..	..	..	..	<u>53</u>

CONCLUSION.

It is not too much to say that the technical work* of the Army Veterinary Services in France under Major-General Sir John Moore was brought to a high degree of efficiency. Every advantage was taken of the services of officers who were specialists in one branch or another. Major Hobday was appointed acting consultant surgeon to the veterinary hospitals in France, and the improvements effected in surgical technique in operations of certain kinds were largely due to his efforts and to the enthusiasm which he was able to inspire in others.

In the medical treatment of disease also, the force had the benefit of the services of many eminent members of the veterinary profession who volunteered for service during the war. The treatment of mange on a large scale by means of calcium sulphide solution, first by hand and later in dipping baths, originated from the suggestions of Captain Perry, A.V.C., who came from Canada, and Captain Evans of the Canadian Army Veterinary Corps. The latter corps also provided Captain Watson, who was in charge of the bacteriological laboratory throughout its operations. The harmonious subordination and co-operation, in all matters of technical organiza-

* Particulars of the diseases that prevailed in France and Belgium, and the veterinary statistics for the campaign, are contained in Chapter XXIII. A detailed description of the working of the veterinary units is given in Chapters XXV, XXVII and XXVIII.

tion, of the Canadian Army Veterinary Corps under Brigadier-General W. J. Neill and Colonel C. E. Edgett, and the Australian and New Zealand Veterinary Corps under Colonel E. A. Kendall, contributed in an important degree to the general efficiency of the veterinary services in France.

Another favourable circumstance which deserves emphasis is the moral support which was given by Their Majesties The King and Queen, the Duke of Portland, Lord Lonsdale and other distinguished lovers of animals. By their visits to the veterinary hospitals in France and by their personal encouragement they did much to inspire enthusiasm in all ranks of the corps and confidence in its undertakings.

The outstanding achievements in veterinary matters were :—

- (1) The organization at the front for the prevention of disease, and the prompt evacuation of sick and wounded animals.
- (2) The control of mange.
- (3) The good condition of animals discharged for duty from veterinary hospitals.
- (4) The construction of veterinary hospitals and convalescent horse depots.
- (5) The interior economy of veterinary hospitals.
- (6) The control of glanders.
- (7) The disposal of animals.

Of these achievements not the least notable was the condition of the animals on discharge. In other armies, and at other periods in the history of our army, the condition of animals sent out for duty from veterinary hospitals has sometimes been the subject of adverse criticism, but in the Great War, and especially in France, there was little room for improvement in this respect.

In the construction of hospitals much help was rendered by Mr. A. E. Fass, a civilian worker who gave his services without remuneration on behalf of the Royal Society for the Prevention of Cruelty to Animals in supervising the assembling of buildings provided by that society. Essential help in construction was also given by the many specially enlisted N.C.Os. and men of the Army Veterinary Corps who had been craftsmen of various kinds in civil life.

In the interior economy of hospitals, the quartermasters who were specially obtained during the war gave the greatest assistance.

The work of the conditioning of animals before discharge from hospital depended very much upon the care, capacity and love of animals of the N.C.Os. and men of the corps. Included in these was a considerable proportion of farmers, grooms, and others, who had extensive experience of animals in civil life, and their services were an important factor in the results achieved.

Last, but not least, there was esprit-de-corps and the willing response which is evoked by a kindly interest in the welfare of subordinate personnel in the matters of accommodation, food, and recreation.

CHAPTER X.

THE VETERINARY SERVICES ON GALLIPOLI.

EARLY in 1915 the Admiralty were instructed to prepare for a naval expedition in February to bombard and take the Gallipoli Peninsula and destroy the forts, thus opening up the passage to the Black Sea. Operations were begun on February 19th and ended on March 10th, when it was decided to make a further attempt with the co-operation of a land army.

The Mediterranean Expeditionary Force was formed for this purpose. It consisted of :—

A.D.V.S.

The Royal Naval Division.

29th Division from England.

Australian Division from Egypt.

Australian and New Zealand
Division from Egypt.

Two French Colonial Divisions.

Major J. J. Griffith, A.V.C.

Major T. Matson, A.A.V.C.

Lieut.-Colonel A. R. Young,
N.Z.A.V.C.

The Royal Naval Division had no A.D.V.S., and the Veterinary Service was administered by Captain M. P. Walsh, A.V.C., who commanded No. 19 Mobile Veterinary Section attached to the Division, which had the following executive officers :—

Major Stuart, R.N.R. (M.R.C.V.S.)

Lieut. Broad, R. Marines (M.R.C.V.S.)

Lieut. Scott, A.V.C.

Lieut. Davidson, R. Marines (this officer was not a qualified practitioner but had been a veterinary student).

For the Veterinary Directorate A.D.V.S. (Colonel E. Taylor) and a D.D.V.S. (Lieut.-Colonel W. J. Tatam) were appointed.

The 29th Division and Royal Naval Division had mobile veterinary sections at this period. These units had not yet been formed for the Australian and New Zealand Divisions in Egypt.

Mudros Bay in Lemnos was selected as the advanced base, but when the divisions from England arrived there it was found necessary to redistribute the troops on the transports to enable them to disembark ready for immediate action. This could not be done at Mudros, and the whole force had to be sent to Alexandria, causing a delay of some weeks.

Details of some units with a considerable number of animals were left in Alexandria, which was used as a base by the M.E.F. By the middle of April the expedition began to arrive in the Bay of Mudros. Part of the force was landed on the island and the rest remained on board ship, and practised, day and night, the landing of men, horses, and guns. Transports conveying the covering force left Mudros on April 23rd and arrived off Tenedos on the morning of the 24th ; during the afternoon the troops were transferred to

the warships and fleet sweepers in which they were to approach the shore. Five beaches were selected for landing at Cape Helles, and a small narrow beach near Gaba Tepe was selected for the landing of the Australian Force.

The animals were transferred from horse transports to lighters of various sizes capable of carrying twenty-four to seventy-six horses, in addition to guns, etc. There were very few mishaps in slinging the animals from the transports into the lighters.

The landing, which involved the separation of the force by considerable intervals, commenced on the morning of the 25th and was completed on the evening of the 26th. There was determined opposition from the enemy at various points and, subsequently, serious fighting at close quarters, when our casualties were heavy and the troops much exhausted.

There was too little room for so large a force at Cape Helles ; hence an advance was ordered for the 28th, and although the main objective was not obtained, the force established itself firmly on the butt of the peninsula.

There were comparatively few casualties amongst the animals during the actual disembarkation and landing at Cape Helles, but during the first week on shore, especially on the night of May 1st, there were many from rifle, machine gun, and shell fire.

It is not within the scope of this history to go into the details of the military operations which took place after the landing. It will suffice to give the dates on which there were active operations, and to refer to any details which had a direct or indirect effect on casualties and the deterioration in the health of the animals.

There was continuous fighting from April 26th to May 2nd, which included the first battle of Krithia ; and from May 6th to 9th, which included the second battle of Krithia ; while a third attack on Krithia was made on June 4th. The object of these attacks was to drive the Turks from Achi Baba, a strongly fortified hill which checked all attempts to advance ; and, although ground was gained on each occasion, the main objective was not attained. Early in May the Royal Naval Division and 29th Division were reinforced by the 42nd (E. Lancs. Division) T.F. from Egypt and the 29th Indian Brigade. There was a Turkish offensive from June 4th to 11th, a fruitless Turkish attack on June 18th, British counter attacks on June 21st and 28th, followed by a Turkish counter attack on June 29th and 30th. In July we attacked on the 12th and 13th, and were in turn attacked by the Turks on July 21st, 23rd and 28th. Both sides suffered heavy losses.

The M.E.F. was now reinforced by the arrival of three divisions of the New Army (10th, 11th and 13th), two territorial divisions (53rd and 54th), and the 2nd Mounted Division (dismounted) which had been in Egypt for some months. The C-in-C. decided that he would use this addition to his force in an attempt to break out from the Anzac position and to turn the enemy in front and rear. The

new landing took place at Gaba Tepe and Suvla Bay. The force was organized into three corps as follows :—

<i>Corps.</i>	<i>Location.</i>	<i>Units.</i>
8th ..	Cape Helles ..	29th Division. 42nd „ 52nd „ R.N. „
9th ..	Suvla Bay ..	*10th „ 11th „ 53rd „ 54th „ †2nd Mtd.,,
Anzacs	Sari Bair ..	Australian and New Zealand Div. †1st, 2nd, 3rd Brigades A.L.H. †New Zealand M.R. 13th Division. 29th Brigade (10th Division). 29th Indian Brigade.

* Less 29th Brigade.

† Without horses.

A landing was effected by August 7th and was followed by terrific fighting which lasted until the 9th, by which time our troops were exhausted. Our objective, the Anafarta Hill, was not attained, and our casualties amounted to 30,000.

The enemy employed ten divisions in the defence of Gallipoli. Their casualties have never been published, but their losses have been stated to have been as severe as our own.

Our plans had failed and the campaign had been brought to a standstill. Winter was approaching, and contrary winds made the task of supplying the force extremely difficult.

A new C.-in-C. (Sir Charles Munro) took over command of the M.E.F. in October. He reported decisively in favour of evacuation, and on December 7th the Government decided to act on this report. The evacuation of the positions at Suvla and Anzac ranks as one of the most notable achievements in military history. Embarkation commenced on December 8th, and on December 20th the last transport moved from the coast. Through good staff work, perfect organization and discipline, aided by fine weather, the operations were successful beyond hopes.

On December 27th the government sanctioned the withdrawal from Cape Helles. This commenced towards the end of the month and was completed successfully by January 9th.

The Gallipoli peninsula extends from Bulair to Cape Helles in a south-westerly direction for fifty-two miles, attaining near its centre a width of twelve miles. The northern coast slopes down to the Gulf of Zeros in a chain of precipitous hills, while the southern half of the peninsula is shaped like a boot, the toes of which form a promontory five miles wide stretching from Tekke Burm to Sadd-el-Bahr. The country is broken, mountainous,

intricate, and arid. There are no roads, and the light sandy soil soon churned up, making draught-work for horses and mules very severe. The coast line is precipitous, and the only practicable beaches are small cramped breaks in the line of cliffs. These were exposed to registered and observed artillery fire, and in some of them wire entanglements had to be broken through on landing. The positions won after hard fighting were without depth; the communications were insecure and dependent on the weather.

The selection of sites for horse lines was limited since all were within gun range of the enemy, and great care was taken to protect the lines as far as possible in this respect. But soon after disembarkation at Cape Helles and Anzac there were many casualties from shell, rifle, and machine-gun fire; and at Cape Helles, on May 10th, the D.V.S. discussed this matter with the Camp Commandant and the A.Q.M.G., M.E.F. They made a detailed survey of the available ground and selected fresh sites for horse lines of all mounted units, after which there was an appreciable reduction in such casualties.

At Anzac and Suvla similar action was taken by the senior veterinary officers on the spot, and some of the units made ideal lines by digging-in under the edges of the cliffs.

In July, August and September the heat was terrific, khamsins frequent, and everywhere a plague of flies. The troops were huddled together, and the ground soon became tainted in spite of the care taken, with the result that fever and dysentery became rampant. Troops became enervated from privation and disease, a condition of things which made it almost impossible for officers and men to pay a great deal of attention to those details of animal management requisite for general health and good condition. Repeated calls for reinforcements resulted in shortage of personnel in horse lines; this was unavoidable. Amongst other things shoeing was necessarily much neglected, for in some of the artillery units practically every farrier was taken away from his work for gun-laying at the front.

After the terrific heat of the summer it was the misfortune of the men and horses to suffer from the other extreme in the autumn. On November 27th it rained without ceasing for twelve hours. Trenches were converted into canals, dugouts into cisterns, and every nullah became a raging torrent. The following day the wind changed to the north and frost set in; and this was succeeded by a blizzard which lasted three days. The effect of the storm was more severe at Anzac and Suvla than at Cape Helles. There were many deaths from exposure amongst the men, and thousands were evacuated sick as a consequence. Animals did not suffer the same fatalities as men, but the want of rugs and shelter from wind and cold, and the temporary shortage of personnel to look after feeding, etc., resulted in considerable loss of condition. Soon afterwards as many animals as could be spared were transferred to Mudros and Alexandria.

The location and possible sources of water on the peninsula were unknown, and this necessitated special provision being made. Water lighters towed by a tank steamer were brought to Mudros and were timed to arrive at beaches by daylight. When they were emptied they were to return at once to refill from the parent water ship.

At Cape Helles, soon after landing, difficulties occurred in making satisfactory arrangements for the watering of animals. The water to be obtained from local springs was limited, and sufficient pumps and troughs had not been provided, though later these were increased, and springs were enclosed with wire fences; as more ground was available additional water supplies were found. There were several wells in the neighbourhood of the camps. The water in these was fit for animals but unfit for troops. The wells soon ran short of water, and at the beginning of the hot weather only the daily watering parade could be held. The excellent condition of the animals when landed enabled them to undergo this privation without any appreciable effect.

At Anzac a high level reservoir, with a holding capacity of 300,000 gallons, was built and fitted out with a regular system of pipes and distribution tanks. Petrol tins, milk cans, camel tanks, water bags, and pakhals were used for its distribution later. From the experience gained at Helles, it was found necessary at Suvla to use a specially fitted-out steamer with stores, i.e. water pumps, hose, tanks, troughs, entrenching tools, and all ordnance stores requisite for the prompt development of wells or springs.

Finally, 3,700 mules, together with 1,750 water carts, were provided for Anzac and Suvla, in addition to 950 mules already at Anzac. General Birdwood also purchased locally 100 small donkeys and saddles for the purpose of carrying water.

It is interesting to note that a few hours after landing the Australian engineers sank two tube wells at the mouth of Shrapnel Gully. The following day twenty shallow wells were sunk which yielded 20,000 gallons daily, and troughs for 800 animals were immediately erected.

From this brief description of the water situation it will be realised that the horse population on the peninsula had to be very limited, more particularly in the early stages. The artillery were only allowed to land one team of horses for each battery. The 42nd (E. Lancs.) Division took most of their animals to Gallipoli in May, but owing to lack of space and insufficient water they were not disembarked and had to be returned to Alexandria. The animals of other units which could not be landed were sent to Mudros and Imbros or returned to Alexandria. After disembarkation, further difficulties were encountered as watering parades invariably raised columns of sand which made an excellent target for the enemy guns. At first casualties were frequent, and to avoid them watering had to be done at night and in the early morning. The sick animals under treatment in the mobile veterinary sections requiring water were sent singly at intervals of 100 yards and marched back in the

same way. On one occasion, through this order being disregarded, No. 19 Mobile Veterinary Section had three horses killed and three men severely wounded. Units were allotted to wells, and time-tables drawn up to prevent congestion and ensure all animals obtaining a sufficient quantity.

The forage consisted of oats, crushed barley and maize, compressed forage and hay, and with the exception of the maize, which was frequently heated, the quality was good. The difficulties of landing and distributing the forage, especially hay, during the rough weather, resulted in animals being on half rations on several occasions. This led to ingestion of sand, which was invariably followed by an increase in the number of cases of sand colic. Hay nets were found to be very necessary, as hay was blown away when fed off the ground. On the few occasions when fault was found with the quantity or quality of forage received by units it was promptly remedied. On landing, a small quantity of green barley was found growing at Cape Helles, and this was collected and issued to animals under treatment in mobile veterinary sections.

Artillery officers complained of the excessive weight of the shoes issued. These were the regulation pattern, and quite suitable for Northern Europe, but clumsy and cumbersome for the Near East. The D.V.S. recommended the type of shoe used in India and South Africa. This recommendation was referred to the War Office, and eventually a proportion of these shoes were issued, but they did not arrive in time for use on the peninsula. It was found that mules did their work more satisfactorily without hind shoes.

Work at the time of landing and for several days afterwards was very severe, as only one team, a battery of artillery, could be landed in the early stages. The horses had to go back to the beach for each gun, draw it through the heavy sand of the shore, then return for the ammunition waggons and later for the water carts. Work was relieved considerably by the arrival at the end of April of the Indian Mule Corps and the Zion Mule Corps, which were very heavily worked all the time, and all the animals were frequently under shell fire. Ten days after landing, the beaches were shelled every afternoon and evening with the greatest regularity. The shelling was in salvos and at intervals of five minutes. Lieut. C. M. Stuart, A.V.C., shot eighty hopelessly wounded animals on one occasion. For three days veterinary officers hid in dug-outs, and emerged during the intervals of shelling to shoot seriously wounded cases. The mobile veterinary section of the 29th Division was badly shelled one afternoon, a number of horses and men being killed. Many of the animals admitted were wounded whilst under hospital treatment. The section was moved to a safer place, after which there was comparative freedom from shell fire. The R.F.A. and transport animals suffered most severely. The wound casualties in the Indian Transport Corps at Cape Helles between April 25th, 1915, and January 29th, 1916, were approximately 500 (25 per cent.). The greatest number wounded at Cape Helles

by one shell was eighteen. At Anzac, the casualties in the Indian Transport Corps from April 25th to August 15th, 1915, were :—

	<i>Horses.</i>	<i>Mules.</i>	<i>Total.</i>	<i>Per cent.</i>
Killed	2	259	261	16
Wounded	4	599	603	31
	6	858	864	

The animals maintained their condition and health wonderfully on the peninsula considering all the vicissitudes incidental to the campaign. It was not until September and October that an appreciable loss of condition was observed. In some cases this was attributable to work, in others to unavoidable shortage of personnel in the horse lines, and in a few instances to exposure. It is interesting to note that there were very few cases of debility evacuated to veterinary base hospitals from Gallipoli until November and December, whereas details of the various units at Alexandria provided the bulk of the admissions for debility to veterinary hospitals continuously throughout the summer and autumn. This was due to the incessant call for reinforcements and insufficient personnel being provided for the care of animals with units. The D.V.S. called attention to this on several occasions and recommended the employment of local syces in unit horse lines to ensure regular feeding and grooming.

With the limited space at the disposal of the troops on the peninsula, the change of ground so necessary for sound sanitation was practically an impossibility. Horse manure was burnt in incinerators in most camps, and when this was not possible it was dumped in heaps as far from the line as possible or thrown over the cliffs into the sea. The manure dumps favoured the breeding of flies, and indirectly reacted on the health of the troops in causing physical annoyance as well as spreading dysentery.

The disposal of carcasses was even more difficult. Cremation was impracticable, so burial was tried in the early stages. Owing to the limited ground available it was not easy to find suitable places, and after selecting them troops resting from the severe hardships of battle, or unfit for the front line, had to be called upon to assist in digging enormous graves. Some of the places selected were very sandy, and as fast as the sand was thrown out it fell in at the sides. On one occasion at Suvla a rough sea washed all the top of a burial ground away leaving the carcasses exposed. Some of the carcasses were towed out into the current from the Narrows; some of these were thus washed out into the sea, but the majority drifted out of the current and were cast up on the beaches and rocks along the shore road, where they lay till broken up by the waves. At first the carcasses were not cut open and, after drifting out to sea, the hoofs projected out of the water and were on more than one occasion mistaken for the periscope of a hostile submarine.

Just after the landing at Gallipoli, horse transports from Egypt and the United Kingdom arrived continuously, and were held up for two or three weeks at Mudros and Imbros awaiting orders. Cleaning out and ventilation were difficult whilst the ships were in harbour, and several deaths occurred from pneumonia. There was no provision for the removal of carcasses, and a veterinary officer (Captain Dayer-Smith, A.V.C., T.F.) was appointed to inspect all ships and arrange with the naval authorities for the disposal of them. The carcasses were retained on the ships for two or three days until there was a sufficient number to justify the expense of a ship taking them out to sea, when they were secured by ropes, weighted, thrown overboard, and towed out. Whilst this duty was being carried out there was considerable danger to the ships from submarines.

At Cape Helles on May 13th, the D.V.S. arranged with the Camp Commandant and the principal Naval Landing Officer to have the carcasses of dead animals towed out to sea, but at Suvla the Navy could not spare the material or personnel for this service. Eventually, about the end of July, this method of dealing with them was organized on a sound basis with satisfactory results, the carcasses being towed out in barges or on rafts about two miles, cut open, weighted with stones and thrown overboard.

The following A.V.C. units were sent out from the United Kingdom for duty with the force :—

No. 16 Veterinary Hospital for 250 cases.

No. 17 Veterinary Hospital for 250 cases.

No. 18 Veterinary Hospital for 250 cases.

One Base Depot of Veterinary Stores.

One Advanced Base Depot of Veterinary Stores.

No. 11 Veterinary Hospital for 1,000 cases followed a month later for duty with the 2nd Mounted Division, but was allotted to the M.E.F. Although nearly all the animals of that division were near Cairo, it was decided to locate the hospital at Alexandria, the main base of the force, where a large number of sick animals from transports as well as from Gallipoli were expected. The hospital also functioned as the depot for all A.V.C. reinforcements.

While General Headquarters were awaiting a passage from Alexandria to Mudros, the D.V.S. was unfortunately admitted to hospital. Arrangements were made, however, for the mobile veterinary sections which accompanied the Royal Naval and 29th Divisions to function as small veterinary hospitals pending the arrival of a line of communication unit.

The D.V.S. was discharged from hospital for duty on April 20th, and obtained a passage to Mudros on April 24th, where he arranged with the I.G.C. for orders to be sent to the base at Alexandria for No. 16 Veterinary Hospital and the Advance Base Depot of Veterinary Stores to be embarked for Cape Helles. He then proceeded to this front to inspect units and select sites for horse lines and the veterinary

hospital. Only part of No. 18 Mobile Veterinary Section had been landed by the 30th; the remainder arrived on May 3rd and began to function on May 4th, while No. 19 Mobile Veterinary Section disembarked on May 9th. Both units were soon hard at work dealing with bullet and shell wounds, and as any movement in their lines during the day attracted shell fire, all dressings and operations had to be done late in the evening and very early in the morning.

When the Australian and Australian and New Zealand Divisions were allotted to the M.E.F., there was some doubt about the responsibility for their veterinary arrangements, and the D.V.S. was not able to obtain any ruling in this respect before the departure of the force from Alexandria.

In June, whilst on tour of inspection in Egypt, the D.V.S. conferred with the administrative veterinary officers of the colonial divisions and arranged for the co-ordinate working of their veterinary services. The A.D.V.S. of the Australian division (Major T. Matson, A.A.V.C.) and the A.D.V.S. of the Australian and New Zealand division (Lieut.-Colonel Young) allotted veterinary officers to the various units, and made regimental arrangements for the care and treatment of sick animals at Anzac Cove in the early stages of the operations. These officers accompanied their divisions to the peninsula and afterwards returned to Cairo, where most of the animals of their divisions had been left.

Owing to the secrecy observed with regard to the projected landing, arrangements for the provision of a mobile veterinary section for the Australian and New Zealand Force could not be made until the troops had established themselves on shore. The Australian division formed a mobile veterinary section for duty with the force in June, but owing to a reduction in the number of animals at Anzac it was decided that casualties in this area could be efficiently handled by regimental personnel. The animals remaining (52 horses, 885 mules and 21 donkeys) belonged mostly to Indian mountain batteries and mule corps, and as they were picketed in gullies, and were thus well protected from shell fire, their casualties were few.

The Australian Mobile Veterinary Section was utilized as a small hospital by the Australian details in Alexandria until November, when it was disbanded.

No. 16 Veterinary Hospital and the Advance Base Depot of Veterinary Stores arrived at Cape Helles on May 18th, and disembarked without their horses, as it had been decided that no more were to be landed for the present.

The question of sending sick and wounded animals from Anzac Cove to Imbros, pending transport facilities to Alexandria, was considered towards the latter end of May, when the D.V.S. visited this island and selected a suitable site for the camp, stipulating that it would be necessary to sink a well and develop the water supply before any animals were sent there. As this plan was not persevered

with, owing to lack of facilities for landing and re-embarking, transfer direct to Alexandria was decided on, but there was considerable delay before satisfactory shipping arrangements could be made.

A prospective increase in the strength of the force necessitated a reorganization of the veterinary plans at Alexandria, to which the D.V.S., M.E.F., made a further visit. Horses and mules sent out from home for units of the M.E.F. were being transferred to camps according to ships. This was found to be unsatisfactory and was pointed out to the base commandant, who arranged for the animals to be sent to the camps of divisions to which they belonged.

The unsatisfactory condition of animals in base camps, and the increasing number of cases of debility due to neglect from paucity of personnel, consequent on the continuous demand for reinforcements, led the D.V.S. to recommend the employment of Egyptian syces in unit lines, and the formation of a convalescent horse depot to deal with the worst cases. Local authority to form one was obtained, and War Office sanction followed. The European personnel was obtained from No. 11 Veterinary Hospital, and local syces were engaged at daily rates of pay in proportion to the number of horses on the strength. The depot was built at Mex on the kraal system. Shelters, stores and offices were erected, and corn crushers, unobtainable from the ordnance depot, were purchased locally. The depot received its first batch of animals on June 24th, and by July 10th it contained 769 horses and mules. Authority was obtained from the base commandant in August to increase the accommodation so as to be able to deal with 1,200 animals.

The provision of camps in Alexandria for personnel and animals of the various divisions of the M.E.F. presented many difficulties, chiefly in connection with water supply, sanitation and prevention of disease. The camps extended from the docks to Aboukir, about nine miles in an easterly direction, and San Stephano, about five miles in a south-easterly direction. The services of administrative veterinary officers were in constant demand for inspection and advisory duties. Two extra horse ambulances were urgently required for the transportation of sick animals from the docks and various camps, and the D.V.S., M.E.F., was fortunately able to get them built locally with little delay.

In addition to the above-mentioned details at Alexandria, there were about 2,500 animals of various units at Mudros Island. The A.D.V.S. of the 10th Division (Major H. Greenfield, A.V.C.) was appointed S.V.O., and acted in this capacity until October when his division was transferred to Salonika. Attention was frequently called to the lack of animal supervision in many of the units in which similar causes prevailed as in Alexandria. Up to November the sick animals in Mudros were treated under regimental arrangements. It was then decided to transfer Nos. 18 and 19 Mobile Veterinary Sections from Cape Helles to Mudros, where they could act as small hospitals as well as veterinary evacuating units for sick

animals received from the peninsula for transfer to No. 11 Veterinary Hospital in Alexandria. The advanced base depot of veterinary stores was transferred to Mudros with No 19 Mobile Veterinary Section, which was located in the most central position for distributing stores.

No mobile veterinary section was sent to Suvla at the commencement of operations; sick and wounded animals were being transferred to Alexandria direct until the arrival of No. 22 Mobile Veterinary Section of the 11th Division, about the end of August, three weeks after the landing. This unit functioned as a small hospital at Suvla, and, in addition, conducted sick animals by sea to Alexandria or Mudros when shipping facilities permitted.

It has already been pointed out that great restrictions had to be made in the number of animals originally intended for use on the peninsula, and this, in conjunction with the constant shifting of animals to and from the base detail camps at Alexandria, Port Said, Mudros and Imbros, made it impossible to ascertain the exact number of animals landed, killed, died and wounded during operations. The rendering of states and returns, the collation of these from so many widely distributed camps, and the loss of correspondence en route, etc., involved great delay and frequent discrepancies. The following state compiled soon after the Suvla landing gives an idea of the number of animals and of veterinary officers allotted to these corps.

Cape Helles.—8th Corps.

	Horses.	Mules.	Veterinary Officers.
Royal Naval Division	165	370	1
29th Division	2,064	650	5(a)
42nd Division	421	252	1
52nd Division	68	68	—
Miscellaneous Units	49	10	—
No. 16 Veterinary Hospital	40	—	2
No. 18 Mobile Veterinary Section ..	5	—	1
No. 19 Mobile Veterinary Section ..	12	—	1
Total ..	2,824	1,350	11

(a) Including A.D.V.S.

Anzac.

	Horses.	Mules.	Veterinary Officers.
Australian and New Zealand Army Corps	50	1,739	3
1st Australian Division	35	—	—
New Zealand and Australian Division ..	69	150	1
Total ..	154	1,889	4

Suvla.

	Horses.	Mules.	Donkeys.	Veterinary Officers.
9th Army Corps	419	2,063	30	3(a)
No. 22 Mobile Veterinary Section	33	100	—	1
Total ..	452	2,163	30	4

(a) Including A.D.V.S.

In addition, there were about 5,000 animals at Alexandria, 3,080 in Mudros, and nearly 20,000 in other parts of Egypt belonging to formations taking part in these operations. There was little alteration in the above strength until the evacuation of the peninsula commenced. As horses or mules became surplus to requirements and shipping was available, they were despatched to Alexandria or Mudros, the sick being transferred on every possible occasion.

Horse-transporters were unable to get alongside on the peninsula or on any of the islands, as submarines were very active and prevented them from anchoring near the coasts. Every animal evacuated had to be slung on board; and in the case of those placed on small ferry steamers from lighters, the operation had to be repeated when they were transferred to transporters in Mudros Bay. This difficulty had to be taken into consideration in the selection of sick animals for evacuation, those which were too ill or too seriously injured for slinging being destroyed.

The formation of the Salonika force took place just before the evacuation, and necessitated a redistribution of veterinary units. No. 15 Veterinary Hospital and No. 4 Base Depot of Veterinary Stores had been sent out from the United Kingdom for this army. They had disembarked at Alexandria, and there was some delay in obtaining a ship for their transfer to Salonika. In the meantime, the 10th Division was being sent from Suvla and Mudros. Owing to the uncertainty of the shipping situation, the D.V.S., M.E.F., decided to send No. 17 Veterinary Hospital, which was on its way to Mudros, to Salonika and to replace it by No. 18 and 19 Mobile Veterinary Sections from Helles, the transfer of which has already been mentioned. A sufficient quantity of veterinary stores was sent to Salonika with No. 17 Veterinary Hospital, and the D.V.S., M.E.F., proceeded there to make the necessary arrangements at the base. This hospital was located at Camp "A," Alexandria, from April 5th to May 13th, and was used for sick animals disembarked from horse transporters. On May 14th it was moved to Zaharia camp to deal with an outbreak of influenza amongst details of the Australian and New Zealand Divisions. It embarked for Mudros on October 1st.

It has already been observed that the administrative veterinary officers of two divisions only were on the peninsula. The senior veterinary officer with the troops at Anzac acted in an administrative as well as executive capacity. Corps headquarters frequently

needed the advice of a veterinary administrative officer, but as this had not been authorized in war establishment at the time, the A.Ds.V.S. of the 29th and 11th Divisions at Cape Helles and Suvla respectively were detailed to act as S.V.Os. to the corps in addition to their divisional duties.

Actual battle casualties to veterinary officers were fortunately rare, and one officer only, Lieut. Brownless, was killed on June 16th. Sickness, however, was very prevalent, fifteen cases being admitted to hospital from various causes. The delay in replacing them from Alexandria frequently disorganized veterinary arrangements, but the situation was saved by administrative officers doing executive duty, and by the exemplary devotion of all ranks of the corps to their various and exacting duties.

The decision to evacuate Suvla and Anzac was announced at a conference at G.H.Q. on December 8th, and operations commenced on December 11th. The embarkation took place at night. The animals were conveyed in small steamers and lighters and landed at Kephalos, Mudros or Tenedos, as was found most convenient, or transhipped directly to larger horse transports for despatch to Egypt and Salonika, so that there was at least one transshipment, and, for the greater portion of the animals, two. Kephalos Bay in the island of Imbros is roughly fifteen miles from the beaches, and Mudros Bay about sixty miles, while the distance from the beaches to the base at Alexandria is 800 miles.

The details of the procedure adopted had to be evolved on the spot. The beaches were under artillery fire, and embarkation of troops, animals and material was only possible under cover of darkness. The sea, ships, lighters and tugs took the place of railways and roads; their use was dependent on the weather, while movement on the beaches was dependent on the activity of the enemy. A veterinary officer was detailed for duty at each point of embarkation, and one was left to the last to superintend the humane destruction of animals which could not be embarked. On transshipment at Kephalos and Mudros, a veterinary officer or an N.C.O., A.V.C., with medicines and dressings for the voyage, was placed on each transport.

A certain amount of confusion was unavoidable, and the submission of accurate returns during, and for some time after, the evacuation was an impossibility.

The strength of animals at Suvla and Anzac on December 4th, 1915, was as follows:—

			Horses.	Mules.	Donkeys.	Total.
Suvla	..	..	390	2,107	28	2,525
Anzac	..	..	119	1,845	56	2,020
Total	..	..	509	3,952	84	4,545
Total evacuated between Dec. 8th and 20th	..	..	486	3,752	44	4,282
Killed or missing	..	..	23	200	40	263

All surviving animals at Suvla were evacuated. A number of Indian mule cart corps mules, stated to be 56, and some donkeys were not evacuated from Anzac. A few animals were killed from shell fire during evacuation, and 129 mules were killed or wounded at Kephalos by aeroplane bombs while awaiting ships for transfer to Egypt.

The success of the operations was dependent on weather conditions. Even a mild wind from the south or south-west was found to raise such a ground swell as greatly to impede communication with the beaches. The gale of November 21st had done considerable damage to the improvised piers, lighters and small craft at Suvla and Anzac, whilst at Kephalos one ship, which had been sunk to form a breakwater, was broken up and the whole of the small craft inside the breakwater was washed ashore. Throughout the period December 10th to December 20th, weather conditions were favourable and, in spite of the damage to which reference has just been made, the evacuations proceeded according to plan and with satisfactory results.

The decision to evacuate Cape Helles was announced at a G.H.Q. conference on December 28th. As a scheme had been drawn up in anticipation, it was possible to commence evacuation on December 29th, and this was completed in the early morning of January 9th. The A.D.V.S. of the 29th Division, with four executive officers, was detailed to superintend the veterinary arrangements. No. 16 Veterinary Hospital, with two officers and eighty-five other ranks, also had to be evacuated with the other units. Three large horse transports were despatched as dump ships to Kephalos, where two extra veterinary officers were sent for trans-shipping duties. In other respects the procedure adopted at Suvla and Anzac was followed.

Meteorological conditions were favourable until the evening of the 8th, when the wind continued to rise until 11 p.m. The connecting pier between the hulks and the shore at W. Beach was washed away by heavy seas, and further embarkation from these hulks became impracticable. Hostile submarines were also active in the vicinity. One lighter with thirty-two mules on board capsized and all were drowned, while another with forty-two mules on board went adrift and disappeared. From 2.40 a.m. the steadily increasing swell caused the naval transport officer the greatest anxiety, but by 3.30 a.m. the evacuation was complete. By order of the corps commander, supplies and stores left behind were burnt, and a large number of animals, most of which were destroyed, were abandoned. The sick animals under treatment in No. 16 Veterinary Hospital were ordered to be destroyed on January 1st, and were buried under the supervision of Lieut. Stokes, A.V.C., and forty-five other ranks of the hospital who remained behind for this duty. The O.C. of the hospital (Captain H. C. Stewart) managed to save the six hospital chests, but tents and all ordnance equipment were left behind. The personnel of the hospital was landed at Mudros, and subsequently utilized for horse conducting duties to Alexandria.

It was not possible to check horses and mules separately in the evacuation returns, as at Suvla and Anzac.

The animal strength at Helles on December 29th was :—

	Horses.	Mules.	Total.
Strength	1,495	2,801	4,296
Evacuated between December 29th, 1915, and January 9th, 1916 ..			3,389
Destroyed, missing or abandoned ..			907

The last veterinary officer to leave Cape Helles was the A.D.V.S. 29th Division, who reported at Mudros on January 19th.

On sorting out the evacuated animals at Mudros and Kephalos, it was found that some of the units had animals on both islands and some on transports, and there was thus considerable delay in ascertaining the exact strength of the force. All animals were subsequently examined by veterinary officers, and a large number selected for hospital treatment in Alexandria. The sick and lame were weeded out of those sent to Salonika, as it was realized that No. 15 and 17 Veterinary Hospitals had not had time to become firmly established.

The advance party of M.E.F. headquarters moved from Mudros to Egypt on December 30th, the remainder following from seven to fourteen days afterwards. The D.V.S. left on January 13th, and the A.D.V.S., 29th Division, was detailed to act as S.V.O., Mudros, pending the transfer of the animals remaining on the island.

From what has already been recorded, the difficulties in the veterinary administration of this campaign will be apparent. Headquarters were at Mudros, which is fifty miles by sea to Cape Helles, sixty miles to Anzac, and 650 miles to Alexandria, which was the base for the force where the D.D.V.S., M.E.F., was located. The peculiarity of the lines of communication, the distances to be travelled, the delays through awaiting shipping facilities, the replacement of veterinary officers, the scattered state of the divisions taking part in the operations, telegraphic congestion and postal interruptions, were obstacles which had never before been experienced on such a scale, and had not been contemplated in any of the recognized regulations. Out of the 285 days the D.V.S. served with the force, he was with headquarters 110 days only; 143 days being taken up with inspections at Alexandria, Port Said, Cape Helles, Anzac, Suvla, Imbros and Salonika; 26 days spent at sea; and 6 days in hospital. The addition of a senior veterinary officer to the directorate would therefore have been of the greatest help.

During his inspection of units the following points were brought to notice by the administrative veterinary officers :—

- (1) The necessity for eye-fringes for protection against glare and dust.
- (2) Shortage of personnel in unit lines of base camps.

- (3) Shortage of hay-nets, causing waste of hay ration.
- (4) Badly balanced forage ration, with shortage or inferior quality of some commodities.
- (5) Shortage of horse-rugs and grooming kit.
- (6) Unsuitability of horse-shoes and neglect of shoeing.
- (7) Collar galls from severe work, and neglect of care of breast harness.
- (8) Insufficiency of water and defective watering arrangements, muddy water being used for animals for drinking, causing loss of condition.
- (9) Insanitary condition of certain horse transports.
- (10) Unsuitability of some horse transports through breakage of fittings.

Statistical Returns.—The weekly statistical return "A" shows :—

- (i) The number of slight cases sick with units.
- (ii) The number of died, destroyed, killed and missing.
- (iii) The number transferred to and cured in hospitals and convalescent horse depots.
- (iv) The number and the percentage of the force for replacement.

The weekly veterinary hospital and convalescent horse depot return "B" shows :—

- (i) The number and percentage of animals of the force under treatment in the above lines of communication units.
- (ii) The number and percentage of the force discharged to remount depots for duty.

The weekly wastage return "C" shows the animal wastage at the front and on the lines of communication, the totals indicating the number of remounts to be made good from outside sources.

The consolidated return of animals treated in veterinary hospitals and convalescent horse depots from May 8th to December 4th, shows the disease by classes and the total percentage of died, destroyed and cured.

Approximately 50 per cent. of the admissions to treatment were injuries (including wounds from shell and rifle fire), 25 per cent. were due to digestive trouble, and 10 per cent. due to debility. The number of animals inefficient in veterinary hospitals and convalescent horse depots reached its maximum in December, 1914. This compares favourably with the percentages of those in other theatres of war, whilst the total animal wastage of the force, in view of the conditions which prevailed, cannot be considered excessive. The steps taken to reduce inefficiency from bullet and shell wounds have already been mentioned.

Sand colic is always prevalent when animals are camped or bedded on sand even for short periods, and the incidence is considerably higher when they are continuously on sand. Most cases are caused by animals picking up food off the ground which has fallen from hay-nets and nosebags. Sand colic was very prevalent in the base camps at Alexandria throughout the summer of 1915, and indirectly was responsible for many cases of debility. To

reduce the number of cases the D.V.S. recommended the provision of mangers in all base camps, and asked all veterinary officers to see that units were provided with their full complement of serviceable hay-nets and nosebags.

Reference has been made to the relation between shortage of personnel and debility particularly in base details. In more instances, indifferent horsemastership was responsible, and improvement in condition invariably followed when points in the defective management of animals were pointed out by the administrative veterinary officers.

The bulk of the contagious diseases was attributed to influenza* in animals from horse transports, which in many instances was complicated with pneumonia.

The open air conditions under which the animals were treated were conducive to a low death rate, and the early erection of horse-shelters to protect patients from the effects of the sun ensured early recovery to health.

There was little trouble from parasitic skin disease. The incidence was higher in animals with long coats which had arrived from the United Kingdom. The treatment and prevention of the spread of the disease gave very little trouble, as affected animals were isolated and sent to veterinary hospitals for treatment.

Pustular stomatitis broke out among the animals of the details of the 1st Australian Division at Alexandria in July, 1915. Two cases were reported on the 8th and by the 16th fifty-one cases had occurred. Affected cases were promptly isolated, and the whole camp quarantined. No fresh case was observed after the 13th, and quarantine restrictions were removed on the 30th.

The force was particularly free from glanders during the whole of the operations. One case occurred in a mule landed at Alexandria from U.S.A. in October, and one animal evacuated from the peninsula was found to be clinically affected. The mallein test applied to in-contacts in both instances gave negative results.

Stores.—A base depot and an advanced base depot of veterinary stores were sent out from the United Kingdom in March for the M.E.F. The former was landed at Alexandria about the end of the month and located at Camp "A," Alexandria. There it remained until June, when it was transferred to Mustapha Camp, where there was more room and there were better facilities for receiving and distributing stores.

The advanced base depot of veterinary stores was sent to Cape Helles in May with No. 16 Veterinary Hospital, and it commenced to issue stores on May 19th. It remained here until October, when it was transferred to Mudros West under the direction of the officer i/c of No. 19 Mobile Veterinary Section of the Royal Naval Division. On its return to Alexandria in January, 1916, the personnel was absorbed in No. 11 Veterinary Hospital, and the stores handed over to the base depot of veterinary stores.

* There is little doubt that this disease was the "shipping-fever" variety of pneumonia and not influenza. (Editors.)

One or two units landed on the peninsula without stores, having lost them en route, and occasionally there was a little delay in obtaining replacements. The supply and distribution of veterinary stores, however, throughout the Gallipoli operations were satisfactory considering the transport difficulties peculiar to the campaign. One large supply from the United Kingdom for the base depot at Alexandria was landed by the naval authorities at Mudros in error in November, 1916. This was taken over by the advanced base depot in a damaged condition through rough weather at sea and, after losses and breakages had been noted, they were repacked and forwarded to Alexandria.

A large quantity of stores was received at Alexandria from horse transports, and was put in charge of the base depot.

TABLE A.—*Weekly Statistical Return.*

Date. Week ending	Strength of Horses and Mules.	Sick with Units in the Field.	Died, Destroyed, Killed and Missing in Field Units.	Transferred to Veterinary Hospital and C.H.D. from Field Units.	Total No. for Replace- ment in Field Units.	Percentage for Replace- ment in Field Units.	Remarks.
1915.							
May 8th	4,168	188	44	27	71	1.70	* Nearly all fatal casualties due to shell fire.
" 15th	6,195†	205	143*	21	164	2.37	
" 22nd	5,694	302	104	34	138	2.42	† 29th Division increase due to arrival of E. Lancs. (R.N. Divisions).
" 29th	21,252†	731	410*	1,337*	1,747	8.22	
June 5th	22,951	646	63	248	311	1.35	† Increase due to arrival of Australian and New Zealand Divisions.
" 12th	23,694	711	122	381	503	2.12	
" 19th	26,344†	849	120	273	393	1.49	* Most of the casualties occurred at Cape Helles.
" 26th	26,000	850	93	136	229	.88	
July 3rd	29,366†	926	89	179	268	.91	† Increase due to arrival of 52nd Division.
" 10th	34,556†	844	49	264	313	.90	
" 17th	34,648	853	34	211	345	.70	† Increase due to arrival of 13th Division.
" 24th	36,619†	788	86	284	370	1.10	
							† Increase due to arrival of 11th Division.

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July 31st	38,695†	993	73	184	257	.66	† Increase due to arrival of 53rd and 10th Divisions.
Aug. 7th	38,859	934	131	313	444	1.14	
" 14th	40,526†	978	137	259	296	.97	† Increase due to arrival of 54th Division.
" 21st	40,869	924	77	266	343	.84	
" 28th	41,254	1,016	104*	213	317	.76	* Includes 56 horses and 16 mules killed, and 64 horses and 2 mules wounded during landing at Suvla.
Sept. 4th	41,225	1,222	106	233	339	.82	
" 11th	41,210	944	72	370	442	1.07	
" 18th	42,207	950	81	370	451	1.06	
" 25th	41,886	960	47	520	567	1.11	
Oct. 2nd	42,003	955	32	349	381	.90	
" 9th	41,873	1,046	46	301	347	.82	† Reduction due to transfers to forces in Egypt and Salonika.
" 16th	40,981	941	66	421	487	1.19	* Includes 541 drowned in H.M.T. Marquette.
" 23rd	36,005†	830	574*	323	897	2.49	† Reduction due to transfers to forces in Egypt and Salonika.
" 30th	36,308	822	51	263	314	.86	
Nov. 6th	29,958†	579	28	245	273	.91	† Reduction due to transfers to forces in Egypt and Salonika.
" 13th	22,540†	334	18	229	247	1.09	† Reduction due to transfers to forces in Egypt and Salonika.
" 20th	22,133	428	45	205	250	1.12	
" 27th	23,083	405	34	558	592	2.52	
Dec. 4th	20,989†	399	63	226	289	1.37	† Reduction due to transfers to forces in Egypt and Salonika.

TABLE B.—Table showing number of Horses and Mules discharged to duty and inefficient in Veterinary Hospitals and Convalescent Horse Depots.

Date, Week ending	Strength of Force.	No. in Veterinary Hospitals.	Per- centage.	No. in Convales- cent Horse Depots.	Per- centage.	Total No. inefficient remaining.	Per- centage.	Cured.	
								Total No. Discharged to duty.	Percentage of Force.
May 8th, 1915	4,168	21	·50	—	—	21	·50	4	·009
" 15th "	6,195	44	·71	—	—	44	·71	13	·20
" 22nd "	5,694	65	1·14	—	—	65	1·14	1	—
" 29th "	21,252	1,097	5·16	—	—	1,097	5·16	332	1·50
June 5th "	22,591	1,074	4·75	—	—	1,074	4·75	218	·90
" 12th "	23,694	1,163	4·95	—	—	1,163	4·95	159	·60
" 19th "	26,344	1,209	4·58	—	—	1,209	4·58	169	1·10
" 26th "	26,000	1,099	4·22	72	·27	1,171	4·50	203	·80
July 3rd "	29,366	931	3·16	274	·93	1,205	4·10	163	·55
" 10th "	34,556	1,025	2·96	769	2·22	1,794	5·19	136	·39
" 17th "	34,648	1,032	2·97	577	1·66	1,609	4·64	377	1·10
" 24th "	36,619	1,101	3·00	356	·97	1,457	3·97	385	1·05
" 31st "	38,675	910	2·35	508	1·31	1,418	3·66	262	·68
Aug. 7th "	38,859	1,018	2·61	399	1·02	1,417	3·64	367	·94
" 14th "	40,526	979	2·41	501	1·23	1,480	3·65	294	·73
" 21st "	40,869	931	2·27	537	1·31	1,468	3·59	244	·59
" 28th "	41,254	810	1·96	479	1·16	1,289	3·12	292	·71
Sept. 4th "	41,225	772	1·87	562	1·36	1,334	3·23	235	·57
" 11th "	41,210	884	2·14	448	1·08	1,332	3·23	254	·61
" 18th "	42,207	1,020	2·41	495	1·17	1,515	3·58	200	·48
" 25th "	41,986	1,199	2·85	609	1·45	1,808	4·30	385	·92
Oct. 2nd "	42,003	1,181	2·81	642	1·52	1,823	4·34	258	·62
" 9th "	41,873	1,182	2·82	633	1·51	1,815	4·33	256	·61
" 16th "	40,981	1,366	3·33	768	1·87	2,134	5·20	235	·57
" 23rd "	36,005	1,378	3·82	836	2·32	2,214	6·14	284	·78
" 30th "	36,308	1,205	3·31	812	2·23	2,017	5·55	411	1·13
Nov. 6th "	29,958	1,141	3·80	820	2·73	1,961	6·54	277	·83
" 13th "	22,540	1,133	5·02	874	3·87	2,007	8·90	158	·70
" 20th "	22,133	1,106	4·98	833	3·76	1,939	8·76	241	1·08
" 27th "	23,083	1,286	5·57	870	3·76	2,156	9·34	307	1·33
Dec. 4th "	20,989	1,132	5·39	844	4·02	1,976	9·41	293	1·39

cast and sold) of whole force.

	Date. Week ending	Strength of Force.	Units.	Percentage.	Veterinary Hospitals and Convalescent Horse Depots.	Percentage.	Total Wastage.	Percentage.
May	8th, 1915	4,168	44	1.05	1	.02	45	1.07
"	15th "	6,195	143	2.30	8	.12	151	2.43
"	22nd "	5,694	104	1.82	6	.10	110	1.03
"	29th "	21,252	410	1.92	174	.81	584	2.74
June	5th "	22,591	63	.27	53	.23	116	.51
"	12th "	23,694	122	.51	80	.33	202	.85
"	19th "	26,344	120	.45	56	.21	176	.66
"	26th "	26,000	93	.35	27	.10	120	.46
July	3rd "	29,366	89	.30	39	.13	128	.43
"	10th "	34,556	49	.14	43	.12	92	.26
"	17th "	34,648	34	.09	30	.08	64	.18
"	24th "	36,619	86	.23	50	.13	136	.37
"	31st "	38,675	73	.18	29	.07	102	.26
Aug.	7th "	38,859	131	.33	33	.08	164	.42
"	14th "	40,526	137	.33	30	.07	167	.41
"	21st "	40,869	77	.18	27	.06	104	.25
"	28th "	41,254	104	.25	26	.06	130	.31
Sept.	4th "	41,225	106	.25	24	.05	130	.31
"	11th "	41,210	72	.17	23	.05	95	.23
"	18th "	42,207	81	.19	35	.08	116	.27
"	25th "	41,986	47	.11	42	.10	89	.21
Oct.	2nd "	42,003	32	.07	21	.05	53	.12
"	9th "	41,873	46	.10	35	.08	81	.19
"	16th "	40,981	66	.16	34	.08	100	.24
"	23rd "	36,005	574	1.59	28	.07	602	1.67
"	30th "	36,308	51	.14	47	.12	98	.27
Nov.	6th "	29,958	28	.09	24	.08	52	.17
"	13th "	22,540	18	.07	24	.10	42	.18
"	20th "	22,133	45	.20	45	.20	90	.40
"	27th "	23,083	34	.14	33	.14	67	.29
Dec.	4th "	20,989	63	.30	35	.16	98	.47

CHAPTER XI.

THE VETERINARY SERVICES IN EGYPT AND PALESTINE.

The Force in Egypt, 1914-15.

THE pre-war British garrison in Egypt consisted of one cavalry regiment, one battery R.H.A., one brigade of infantry, one company A.S.C., one company R.E., one mountain battery R.G.A., and detachments of R.A.M.C. and A.V.C. There was also a camel school of instruction.

The veterinary personnel of the garrison consisted of a D.A.D.V.S., one executive officer A.V.C. and seven other ranks. An up-to-date veterinary hospital was located at Abbassia and a branch hospital at Kasr-el-Nil, with accommodation for 112 and 12 animals respectively. Horses and mules were accommodated in permanent stables and the camels were camped on the desert at Abbassia.

On the outbreak of war the whole of the above force together with its animals, with the exception of the camels and a few details, was transferred to the United Kingdom to be fitted for duty with the British Expeditionary Force, a N.C.O. A.V.C. being left in charge of the hospital buildings and stores. The mounted units marched to Port Said for embarkation, and there were several casualties from laminitis attributable to the soft condition of the animals from enforced rest during hot weather.

The 42nd (E. Lancs.) Division (T.F.) and a Brigade of Yeomanry were sent out from England to Egypt in September, 1914, to replace the above-mentioned troops. These formations had their full complement of veterinary officers according to war establishment, but they were without their mobile veterinary sections, as only a few territorial divisions at this period had been able to form these units before the outbreak of the war.

The A.D.V.S. of the division (Lieut.-Colonel Marriott, Reserve of Officers, A.V.C.) was detailed to act temporarily as the administrative veterinary officer to the G.O.C. in Egypt in addition to his divisional duties. The veterinary hospital was re-opened and suitable N.C.Os. and men were obtained from combatant units for the supervision and treatment of sick animals, and there was a peace establishment of Egyptian syces for grooming, etc.

The defence of the Suez Canal was now undertaken, and for this purpose in October, 1914, the 9th Indian Brigade was detached from the 3rd Lahore Division then on its way to France, but the division could not spare an officer A.V.C. for duty with this brigade. Soon afterwards the Imperial Service Cavalry Brigade, the Bikanir Camel Corps, and the Indian Mule Cart Corps arrived from India and were embodied in the Canal Defence Force. With this brigade were two European regimental veterinary officers, one of whom held an Indian qualification, whilst the other had only been through a

veterinary course at the Poona Veterinary School. There were no trained salutries, and the veterinary daffadars were untrained. The Bikanir Camel Corps, with a strength of 400 camels, had one trained salutri, and the Indian Mule Cart Corps, with 1,000 mules, had their full complement of trained salutries. The number of animals in the canal zone was approximately 6,500.

The A.D.V.S. could not obtain an A.V.C. officer from India to deal with this sudden increase in strength, and, being unable to spare one of his T.F. officers, he arranged with the D.V.S. of the Ministry of Agriculture, Egypt, for the loan of one of his senior officers (Mr. H. Mason, M.R.C.V.S.) who was appointed P.V.O. to the canal force and was granted the local rank of major. This officer divided the canal zone into areas for the treatment of sick and injured animals. In each area there were dressing stations under trained salutries of the Indian Mule Cart Corps, to which units that had no veterinary personnel could send their animals. Fortunately the operations at this period were limited to the defence of the canal, and the arrangements made enabled all the veterinary duties to be carried out until more help was available. At about this time the G.O.C. Egypt asked India to send a veterinary hospital for duty with the Indian troops in the canal zone. The request must have been misunderstood, as a set of veterinary hospital chests only were sent out with the 10th Indian Division.

At the end of 1914 the War Office decided to utilise Egypt as a training centre for reserves from overseas, and to combine the defence of Egypt with the provision of a base for the various theatres of war in the near East. The 1st Australian Division arrived in Egypt early in December, and was followed by the Australian and New Zealand Division. Mobile veterinary sections had not been formed for these divisions, but they were accompanied by veterinary sections for the lines of communication to deal with 250 cases as laid down in War Establishments, Part 1.

Early in February, 1915, the enemy attacked the Suez Canal in force, but was successfully beaten off, losing many killed and wounded and prisoners of war. Pursuit of the beaten force was not undertaken, but fifty camels were captured. During the next six months no fighting of importance took place, the enemy confining his attention to mine-laying in the canal. This required repeated long reconnaissances. The extreme heat in the desert during the entire summer made these operations, which covered over 100 miles of canal front, very trying, and practically restricted all movements to the night time. Fortunately there was an ample and varied supply of forage; good water was obtainable, and animals had an opportunity of obtaining rest to recover from the long and arduous patrols over the extensive and waterless areas. In February and March, 1915, the Australian Mounted Division and the Australian and New Zealand Mounted Division arrived and were located at Maadi and Heliopolis, near Cairo, each accompanied by two veterinary sections for 250 cases.

In April the 2nd Mounted Division (A.D.V.S., Lieut.-Colonel Gunn, late I.C.V.D.) with four mobile veterinary sections arrived from England and was located at Mena Camp.

In May, the 4th Mounted Brigade of the 2nd Mounted Division, with its mobile veterinary section, and the divisional artillery were despatched to the canal zone to replace the artillery and engineers as well as the East Lancashire Brigade of the 42nd (E. Lancs.) Division (T.F.), which left to join the Mediterranean Expeditionary Force. The mobile veterinary section was located at Ismalia, where it collected the sick animals of the 2nd Mounted Divisional units and transferred them by rail to the station veterinary hospital at Abbassia in Cairo.

In July two of the R.H.A. batteries of the 2nd Mounted Division and the 28th (T.F.) Brigade left Suez for Aden and were replaced by two batteries of the 42nd (E. Lancs.) Division (T.F.).

The formation of the Mediterranean Expeditionary Force, the despatch of troops to Aden and the Persian Gulf, together with the possibility of dangers from the Senussi on the western Egyptian frontier, and of religious and internal disorders in Egypt, necessitated the transfer of troops to other theatres where their presence was most required, and the canal force was reduced to a number just sufficient to safeguard the canal.

In the early part of 1915 the force in Egypt consisted of four infantry divisions, one yeomanry and one Indian brigade, the Bikanir Camel Corps, three Indian transport companies of camels and various other units, with an animal strength of approximately 20,000 horses and mules and 3,000 camels. There were no mobile veterinary sections left with the force, and with the exception of the Australian and New Zealand veterinary hospitals for 250 cases each, which were restricted in use to their own force, there was in Cairo only one improvised veterinary hospital capable of accommodating 120 cases. In these circumstances the working of the veterinary services was precarious, particularly with regard to contagious disease.

In December, 1914, when it was decided to use Egypt as a large training centre for reserves, the Director-General of Army Veterinary Services obtained approval to send out a regular senior officer (Lieut.-Colonel G. M. Williams) to act as A.D.V.S. to the G.O.C. the Force in Egypt. In addition to considerable war service, this officer had held command of the Depot, A.V.C., and it was considered that he would be invaluable in supervising the training of the newly formed veterinary units of the Australian and New Zealand formations. He had an extensive knowledge of Egypt, having been the senior veterinary officer in the country for five years in pre-war days.

After a thorough inspection of all units in Egypt, the A.D.V.S. turned his attention to the reorganization of the limited veterinary units at his disposal. A regular officer (Captain E. Clive Webb) was borrowed from the Egyptian army and was placed in charge of the veterinary hospital at Abbassia, while extra syces, of whom there was an abundance in Egypt, were employed. The accommodation in the hospital was increased to deal with 1,000 cases by the erection

of temporary horse shelters on the cavalry square near the hospital and by the transfer of three large cavalry stables to the veterinary hospital. A base depot of veterinary stores was also formed and located in a suitable building in the veterinary hospital, and veterinary stores to meet all requirements were cabled for and obtained from home. A non-commissioned officer who had formerly served with the British A.V.C. was obtained from the Australian Light Horse and placed in charge of the stores, being granted a temporary commission as quartermaster. The necessary other ranks were borrowed from the mobile veterinary sections of the 2nd Mounted Division (Yeomanry). The military situation at the moment permitted of two of the mobile veterinary sections of the 2nd Mounted Division being posted temporarily to the veterinary hospital at Abbassia, and this enabled the N.C.Os. and men to undergo practical training pending the arrival of the personnel of a veterinary hospital from England.

Captain E. Clive Webb was recalled to the Egyptian army in August, 1915, and he was replaced by Mr. A. de R. Gordon, M.R.C.V.S., of the Ministry of Agriculture, Egypt, who was given the local rank of captain, and was subsequently granted a commission in the Army Veterinary Corps.

The above organization remained in force until December, 1915, when No. 20 Veterinary Hospital for 1,000 cases arrived from England and was located at Abbassia.

Returns of casualties for the early stages of operations of the Canal Defence Force are not available, owing to the absence of trained European personnel with the force. From January 30th 1915, to February 28th, 1916, the following casualties occurred :—

Diseases.	Admitted.	Cured.	Transferred to Veterinary Hospital.	Died.	Destroyed.	Cast and Sold.	Total.
General	786	485	163	42	36	60	786
Respiratory	218	123	79	12	4	—	218
Circulatory	5	5	—	—	—	—	5
Urinary	15	15	—	—	—	—	15
Generative	25	21	4	—	—	—	25
Digestive	908*	664	178	63	3	—	908*
Lymphatic	13	9	2	2	—	—	13
Nervous	15	10	2	3	—	—	15
Skin	2,738	2,039	687	9	1	2	2,738
Locomotory	229	190	22	1	16	—	229
Specific	461	250	127	12	55†	17	461†
Visual	95	91	1	—	—	3	95
Injuries	1,932	1,276	610	12	29	5	1,932
Total	7,440	5,178	1,875	156	144	87	7,440

* Principally colic and sand colic.

† Principally glanders. Imperial Service Cavalry.

Glanders.

A serious outbreak of glanders occurred in the imperial service brigades soon after their arrival. In December, 1914, two horses of the Mysore Lancers with nasal discharge were shown to the P.V.O. of the Canal Defence Force. He diagnosed clinical glanders, which was confirmed by the mallein test and post-mortem examination. Four immediate in-contacts reacted and were destroyed. Subsequently the whole brigade was tested with mallein from the Lister Institute, when seventy-nine horses gave positive reactions and were destroyed, and 579 animals (37·4 per cent. of the brigade) gave doubtful local or thermic reactions. This mallein was obtained locally, and there was no record of its age or how it had been stored, which may account for the unsatisfactory results. The A.D.V.S. decided, in view of the scarcity of trained cavalry horses in the country, to suspend further testing until a fresh supply of mallein from the Royal Veterinary College, London, was available. The doubtful reactors were placed under working isolation, and routine preventive measures were put in force. The soundness of this decision was fully justified by results, as the brigade was found to be free from glanders when retested in July.

The Imperial Service troops were raised through the munificence of the Ruling Chiefs of Mysore, Hyderabad, and Patiala, and their veterinary arrangements were not under the control of the Army Veterinary Services in India; otherwise steps would have been taken to test all horses and mules on purchase. In these circumstances the animals in question had only been inspected for contagious disease on purchase and before embarkation, and had not been subjected to the mallein test. Soon after the arrival of the Bikanir Camel Corps in Egypt, sarcoptic mange and surra were diagnosed in their animals. By the end of January, 1915, 100 cases of mange were isolated under treatment. The few cases of surra were promptly destroyed, and no further trouble from this disease was experienced during the sojourn of this corps in the canal zone.

Operations on the Western Front, November, 1915, to March, 1916.

The western frontier of Egypt, seven hundred miles long, adjoins the Italian possession of Tripoli. When Italy declared war on Austria, the Italian forces of occupation fell back to the coast, and the inland tribesmen were left to their own devices. Stirred up by German and Turkish agents, these tribesmen, along with the Bedouins of the Libyan plateau and the Senussi tribe, were organized to attack the British in Egypt. In November, 1915, the frontier posts at Sollum and Sidi Barrani were withdrawn to Mersa Matruh which, with a railway only eight miles distant and the sea at its door, was equipped as a base for British operations.

The following force was hastily formed on November 20th, at Alexandria, under Major-General A. Wallace, to operate on this front :—A composite mounted brigade made up of three composite

regiments of yeomanry from details of the 2nd Mounted Division, the veterinary officers being Captain S. J. Williams and Lieutenant A. C. Duncan, A.V.C. (T.F.). One composite regiment of Australian Light Horse with a veterinary officer, the Nottinghamshire battery R.H.A. and ammunition column, and auxiliary services. One composite infantry brigade made up of three regiments T.F., one battalion of Sikhs, auxiliary services, and a divisional train (1st Australian Division).

On November 21st the New Zealand Rifle Brigade, one company of Sikhs, and a detachment of 150 Bikanir Camel Corps, with a few other details with one veterinary officer, marched from Alexandria to make good the Alexandria-Dabaa railway and patrol the Moghara Oasis.

The North Midland Mounted Brigade, complete with officers A.V.C. and its mobile veterinary section, was sent to Fayoum, and a detachment of fifty Bikanir Camel Corps to Wadi Natrun to preserve order. A composite battalion made up of details of the 29th Division was sent to Damanhur for the same purpose.

The infantry was sent by sea to Mersa Matruh. The mounted troops and transport concentrated at Dabaa, the railhead, whence an advance party was sent to make good and develop the wells at Abu Gerah, Baggush, and Jerwala, the only watering place on the 85 miles of desert which separate Dabaa from Matruh. On the coast all the way to Sollum there are many little oases linked up by caravan tracks, and to the south of these tracks lie the endless impassable wastes of the Libyan desert.

It was now the extreme end of the dry season, and as there was only a limited amount of water in the wells only two squadrons could pass over the desert at a time. On December 11th the force marched out of Matruh and attacked the enemy at Wadi Senaab. The infantry experienced great difficulty in marching in the sand of the desert, and they were unable to co-operate with the mounted troops, the horses of which were so fatigued after the operation that they had to be rested on the 12th. On the 13th the enemy was again attacked at Wadi Shaifa and was driven back about a mile with heavy loss, our troops returning to Um Rakhum for the night.

From December 15th to 23rd there were no operations of importance, the period being devoted to reorganizing and strengthening the force, which was now split up into two columns as follows :—

Right Column :—

Royal Bucks Hussars.	1 Section Notts Battery R.H.A.
1st Battalion N.Z. Rifle Brigade.	15th Sikhs.
2/8 Battalion Middlesex Regiment.	Notts and Derby Field Ambulance.
Water Section Australian Train.	

Left Column :—

Brigade Staff and Signalling Troops.	2nd Composite Yeomanry Brigade.
Notts R.H.A. (less 1 section).	2 troops Duke of Lancaster's Own Yeomanry.
1 Troop Derbyshire Yeomanry.	2 troops City of London Yeomanry.
1 Squadron Herts Yeomanry.	Composite regiment, A.L.H. (3 squadrons).
Yeomanry Machine Gun Section.	Yeomanry Field Ambulance.

The approximate number of animals with the force was 5,000.

" B " Mobile Veterinary Section of the 2nd Mounted Division had been added to the force and was located at Mersa Matruh during the subsequent operations. Arrangements were made for sick and wounded animals in field units to be transferred under regimental care to the mobile veterinary section, which in turn transferred them by sea to No. 11 Veterinary Hospital in Alexandria.

In the meantime the enemy had concentrated in force near Gebel Medwa, about eight miles south-west of Matruh. On December 25th the above columns moved out before daylight and were successful in driving the enemy from his positions with considerable loss ; they also captured eighty camels and much live stock. After nightfall the cavalry returned to Matruh, the infantry returning next day, while the enemy retired to Unjeila and Bir Tunis.

From December 28th to 30th a small column from Matruh cleared the country to the south of Matruh and Dabaa, bringing in 100 camels and 500 sheep. From January 2nd to 9th a torrential rain fell, and this continued, with rare breaks, almost incessantly for a week, the country becoming a sea of mud. This delayed active operations until the 12th, when a column moved out and reached Baggush on the 13th, Gebel Howimil on the 14th, and returned to Baggush the same evening, having covered during the day close on fifty miles. On the 15th, part of the column left for Dabaa, the remainder of the force returning to Matruh. Marching had been very difficult and tedious, owing to the swampy condition of the ground, which continually hampered the transport and supply arrangements.

The South African Infantry Regiment was added to the right column between January 19th and 22nd, which period was devoted to rest and refitting.

On January 23rd the force moved out to attack the enemy at Hazalin. By 3 p.m. he was driven from his positions and his camps burnt. The cavalry horses by this time were much exhausted and could not be used for pursuit. The abnormal rain had converted the whole country into a veritable quagmire, and in consequence the wagons of the field ambulance could not be moved. The troops spent the night on the spot in considerable discomfort ; neither supplies nor blankets could be brought up, and the night was intensely

cold and wet. On the 25th the weather cleared, and the troops marched back to Matruh.

As it was realised by this time that greater mobility and more suitable transport were needed in order to effect a more speedy termination of the campaign in these parts, a further and final reorganization of the force was introduced. Between January 25th and February 15th two companies of camel transport corps (2,000 camels each) were added to the force, which was then sufficiently mobile for any situation that might arise. Major-General Peyton took over the command of this force, the staff of which was strengthened, and an A.D.V.S. (Major S. J. Williams, A.V.C., T.F.) was appointed.

Just as the preparations for the advance were approaching completion, it was reported that a hostile force had occupied the Baharia oasis, which lies 200 miles south-west of Cairo and about 100 miles from Fayoum and Minia, and that the oasis of Farafra and Dakhla had also been occupied. To meet this emergency, a separate force under Major-General J. Adye was organized for defensive operations in this area.

Meanwhile preparations for the advance in the north were steadily proceeding. The enemy was located near Agagia, some fourteen miles south-west of Barrani, and was attacked and defeated on February 26th. Barrani was occupied on February 28th and was used as an advanced base for the attack on Sollum, which was occupied on March 14th. In little more than three weeks, General Peyton's force had cleared the country of the enemy for 150 miles from the base of operations, had captured its commander, had taken all his artillery and machine guns, and had driven his scattered forces far beyond the Egyptian frontier. Some ninety-five British prisoners, survivors from the "Tara" and "Morina," which had been torpedoed in November, were located at a place some seventy-five miles west of Sollum and were rescued by a light armoured car battery under the Duke of Westminster. This ended the operations on this frontier.

The water question in these operations presented many difficulties, and was quite as important as either tactics or strategy. It often happened that mounted troops were obliged on account of a scarcity of water to refrain from pursuit and return to the base of operations. Intelligence reports on the amount of water available in some of the wells were sometimes misleading and resulted in modifications in tactics being made at the last moment. Moreover, the water in some of the wells was brackish, and horses took time to get accustomed to it. They drank small quantities only and so lost condition. Hence the general staff, in organizing an attack, had to take into careful consideration the amount of water available in the various wells, as any scarcity of water caused a corresponding reduction in the number of mounted troops that could be utilized in the columns engaged. A reserve water park was formed and was found of the greatest value in supplementing local supplies.

The veterinary administration of the Western Frontier Force was carried out by the A.D.V.S. of the 2nd Mounted Division (Lieut.-Colonel W. D. Gunn, late I.C.V.D.), and the veterinary hospitals in Alexandria, to which their sick animals were transferred, were administered by the D.V.S., M.E.F., up to December 1st, after which date they came under the direction of the D.V.S., Levant base.

Practically all sick and lame animals were evacuated by sea from Mersa Matruh to Alexandria, except inefficient camels, which were marched to Alexandria by road and sent in by rail to No. 1 Camel Veterinary Hospital, Cairo. A scheme had been under consideration for the provision of a small hospital at Beni Salama for the Fayoum force, but this was abandoned after the fall of Sollum.

The following casualties occurred in the Western Frontier Force in horses and mules between December 30th, 1915, and March 31st, 1916:—

Western Frontier Force, E.E.F.

Return of Sick and Injured Animals during the period December 30th, 1915, to March 31st, 1916.

Diseases.	Admitted.	Cured.	Transferred to Veterinary Hospital.	Died.	Destroyed.	Cast and Sold.	Remaining under Treatment.	Total.
General ..	90	49	40	1	—	—	—	90
Respiratory ..	64	44	5	7	1	—	7	64
Circulatory ..	10	3	5	—	2	—	—	10
Urinary ..	1	1	—	—	—	—	—	1
Generative ..	2	2	—	—	—	—	—	2
Digestive ..	272	258	4	8	2	—	—	272
Lymphatic ..	2	2	—	—	—	—	—	2
Nervous ..	1	—	1	—	—	—	—	1
Skin ..	41	26	15	—	—	—	—	41
Locomotory ..	113	68	42	—	1	—	2	113
Specific ..	6	4	—	—	—	—	2	6
Visual ..	6	6	—	—	—	—	—	6
Injuries ..	863	691	122	18	7	1	24	863
Total ..	1,471	1,154	234	34	13	1	35	1,471

Total admissions for treatment .. 93·23 per cent. of force.
 Transferred to hospital 14·88 " "
 Died, destroyed, cast and sold .. 3·11 " "
 Treated and cured in field 73·78 " "

Most of the injuries were slight and were cured under regimental care. There were many bullet wounds received in action and these accounted for most of the deaths and destructions. The majority of these casualties occurred near Agagia towards the termination of

operations, when the Dorset Yeomanry made a gallant and successful charge against three machine guns in position and captured the Senussi general. These cavalry tactics against machine guns in position were repeated later in the campaign on several occasions with success.

With the severe work, inclement weather, the scarcity of water and its brackish nature, and the lack of experience of the troops employed in desert warfare, a much higher wastage might have been expected, and it is satisfactory to record such brilliant results at such a low cost in horseflesh. The digestive trouble (18 per cent. of the admissions) was mainly attributable to sand colic, which was very prevalent.

One thousand three hundred and forty-nine horses and one hundred and sixty-nine mules were employed with the Fayoum Force between December 2nd, 1915, and March 30th, 1916. Of these approximately 43 per cent. were admitted for treatment, 5 per cent. were transferred to veterinary hospitals and 2 per cent. died or were destroyed, cast and sold ; 51 per cent. of the admissions were injuries, 14 per cent. were for digestive trouble, and 10 per cent. were for respiratory diseases, most of which were of a catarrhal nature.

Between February 1st, 1916, and March 30th, 1916, 105 camels were transferred to No. 1 Camel Veterinary Hospital for treatment, whilst the average daily sick under treatment in units averaged 10 per cent. ; most of the latter were injuries to backs, chest pads and feet. Mange cases are not included in the sickness in units ; these will be referred to separately.

EGYPTIAN EXPEDITIONARY FORCE, 1916.

A brief description of the physical features and the climate of the country will enable the reader to appreciate the hardships encountered by animals during the operations which took place prior to and during the crossing of the Sinai Desert.

Physical Features.

Egypt is divided into Lower Egypt, which comprises the delta of the Nile, extending from the sea to just south of Cairo, and Upper Egypt, which extends from this point to Shellal in the south. Along the sea shore the land consists mostly of low barren sandhills or saline waste backed by a series of great salt and brackish lagoons. To the south the fertile plain of the delta slopes very gently upward to the apex, where the elevation is only 30 ft. above sea level. The plain is bounded east and west by the higher ground of the desert, which is not reached by the flood waters of the Nile. On the west are various oases :—Siwa, Baharia, Farafra, Dakla, Kharga, and Kurkur.

The Sinai peninsula lies on the east of the Suez Canal, which runs from the Mediterranean Sea at Port Said to the Gulf of Suez. The desert plateau of Et-Tih lies east of the canal and merges to the south in a triangular area, the head of which projects into the Red Sea, the sides being bounded on the west and east respectively by the Gulfs of Suez and Akaba. The apex of the triangle is occupied

by mountains, the principal peaks of which rise to a height of over 8,500 ft. The country in this region is hilly, stony, sterile, and almost bare, with hardly any vegetation.

There are three caravan routes across the Sinai desert from Suez, Ismalia and Kantara, the latter being by far the most suitable for the line of advance of a large force on account of the protection from the coast and a more abundant supply of water. It is one of the oldest routes in the world, and has been followed from time immemorial by invaders from east and west ; it lies in one of the most desolate and difficult countries for any army to cross.

The sand of the Sinai desert is mostly soft and undulating, and forms in places huge sand dunes 100 ft. in height, the position of which is altered periodically by winds and storms. The lie of these dunes makes direct marches impossible. At night a compass is essential, since there are no outstanding features for guidance, and the difficulties of marching to an advance post some thirty miles away are great, requiring constant training of man and beast. Some localities are marked by palm trees, but these are often in depressions or hidden in hollows and are not visible till close at hand. Except for a very little rough shrub in isolated parts, suitable for the grazing of camels, no vegetation exists in the Sinai desert. Rafa marks practically the end of the desert, and from this point onwards towards Palestine there is fairly good grazing, and in dry weather the roads are sound enough for wheeled traffic.

Water is very scarce in the Sinai peninsula, and this scarcity has always been considered the greatest impediment to the passage of troops across the desert. The northern edge from Kantara, Katia and Romani to Bir el Abd has a better supply of wells than other parts, but they are of small capacity and are far apart, and are wholly insufficient to provide for a large force, the yield of wells varying from 82 to 580 gallons an hour, with an average of 190 gallons. The water from these wells is brackish and unpalatable, and is sometimes totally unfit for men and animals. East of Bir el Abd water is found in comparatively few and widely separated localities, and this scarcity considerably restricts the use of mounted troops. The general staff was continually employed with the problem of locating water, fighting for it, then developing and holding it. To overcome these difficulties a pipe line from the sweet water canal, which runs from Ismalia to Port Said, had to be laid across the desert.

The brackishness of the water depends on the amount of sodium chloride in it. Analyses of samples from various areas gave the following results :—

						Chlorine equivalent to Sodium Chloride.
						Parts per million.
Romani	..	..	..	..	..	5,000 to 8,000
Katia	..	..	..	..	..	2,000 to 5,000
Bir el Abd	..	..	..	..	..	6,000 to 8,000
Salmana	..	..	..	..	..	4,000 to 10,000
Mazar	...	..	..	..	..	5,000 to 7,000
Tilul	..	..	..	..	..	8,000 to 10,000

After several days' use the water in a well may become more saline, but after a period of disuse the salinity is not so marked. Most animals will drink such water when the saline matter does not exceed 8,000 parts, a few will drink it when there are 9,000 parts, but practically none will drink it when there are 10,000 parts per million. Testing parties always accompanied the advance troops, and constant analyses had to be made to ascertain the degree of salinity and prevent units from using any water which might have injurious effects on the animals.

At first horses will not drink brackish water and may lose condition in the process of becoming accustomed to it. When the animals of the force were first brought into the brackish areas, the loss of condition was so severe that whole brigades had to be brought back to fresh water areas for two to three weeks to recover. Remounts sent up to formations in advance areas soon lost their good condition and required care before they could be put to their usual work. Horses suffered from its effects more than mules and camels.

The digging of wells in the sand is an arduous and tedious process, as an immense amount of sand has to be excavated before the water can be reached, since the best wells are usually found at the base of high sand dunes, and their development and construction, owing to the pressure of sand, are difficult until a suitable well lining is available. When water is found at depths of less than 6 ft., sumps may be dug. In the reconnoitred areas the construction of wells was necessary to ensure a supply of water for the horses. A good deal of the difficulty was overcome by the employment of the spear point, which consists of a 2½ in. pipe pointed at one end, and covered with a sheet of perforated brass. This is driven down into the water area by means of a small pulley bar and monkey, or by a sledge hammer, and additional lengths of pipe are added if necessary. The ordinary lift and force pump is then attached. The whole gear, together with the pumps, is easily packed on half a limber, and it can also be carried on a pack animal. By this means troops are enabled to get limited supplies of water in the desert in a very short space of time.

All formations were provided with suitable equipment for developing and pumping water and for repairing old wells, and they were also supplied with light pumps and canvas troughs for watering animals. When the Royal Engineers took over wells from advanced troops, further development took place and a wider distribution of water was made, and in some places power-driven pumps were erected. Areas were allocated to different formations, and watering time-tables were drawn up by divisional headquarters to prevent congestion and ensure all animals being watered daily.

Before the pipe line from Kantara was laid, the army had started on the march forward covering the railway construction parties, and the water had to be carried forward in water trucks on trains

These water trains were filled at a special siding where twenty or more trucks could be dealt with simultaneously, and on arrival they were emptied into a long run of canvas reservoirs laid beside the rails. Here small camel tanks, called fantasses, were filled up and carried forward by camel convoys for distribution to the troops beyond the railhead. Although every endeavour was made to water animals from local supplies, there were occasions when pipe water had to be given to them, and it was found that after drinking this many of them would refuse brackish water for a day or two.

Climate.

The Egyptian climate is characterised by a hot summer, tempered somewhat on the coast by the waters of the Mediterranean, and a mild winter.

The period from November to February constitutes the winter season, when cloudy skies, occasional rain and south-westerly winds occur. March and April are months of transition to summer conditions, which are established in May and continue till the end of September, October being the month in which the change from summer to winter conditions takes place. During the summer months the maximum temperature varies from 105° F. to 117° F., the minimum from 51° F. to 73° F. and the mean temperature from 87° F. to 91° F. Mirage is constant during the hot weather, and this increases the difficulties connected with marching in the desert.

The unhealthiest and most trying period is May and June when the hot south wind (khamsin) prevails. This is preceded by a fall of the barometer and often by a dust-storm of such density as to rival a November fog in London. The temperature rises rapidly as high as 117° F. and remains so for from two to five days, after which it falls rapidly, and the wind changes to the west or north-west. Such conditions are very trying for animals working in the open. Horses and mules in good condition can stand exposure to hot temperatures fairly well, but when from any cause they are below par they soon become exhausted and rapidly deteriorate in health and condition.

On the coast the air is moist at all seasons, although in the afternoon during the summer months it is comparatively dry. Inland the air is usually very dry; humidity is greatest during the inundations of the Nile valley in September. Middle and Upper Egypt receive practically no rain beyond that which falls in an occasional thunderstorm. The average rainfall in Cairo is about 1½ in.; some years being practically rainless, others recording 2 in. to 3 in. The rain is of no pastoral importance since agriculture depends wholly on the Nile for the water needed for crops. In the north and along the coast extending to the Sinai peninsula the average rainfall is about 8 in. During and after rain all unmetalled

roads become almost impassable. Local rainstorms occur occasionally, when large quantities of water run down the ordinary dry valleys (wadis) for a few hours with considerable force, doing great damage to bridges and railways. November to February are the worst months for rain and storms in the Sinai peninsula. Fogs occur, mostly near the coast, during spring, summer, and autumn, and have to be taken into consideration in marching and during operations.

The prevailing wind is north to north-west except during the khamsins, which come from the south. When severe, the khamsins change the whole aspect of the desert. New sand dunes are formed, old ones are blown away, trenches are filled in, wire entanglements disappear altogether, and railway lines become buried or covered with sand, making traffic impossible. During the winter months the effect of the piercing cold winds at night is severely felt by the animals.

In 1915, owing to the difficulty of controlling from London the various administrative services in the Near East, the War Office decided to organize a staff, designated the Levant Base, for this duty. The various directors arrived in Cairo at the end of November, 1916. The Major-General in charge of administration to the G.O.C., Egypt, was appointed temporarily to the command of this organization, pending the arrival from Mudros of Lieut.-General Sir E. A. Altham.

The Levant Base was charged with the administration of all forces operating in Egypt and the Levant, but its relations to the various commands were somewhat complicated. The instructions dealing with the issue of stores and equipment were clear, but those bearing on other important duties were vague. The forces operating in the Near East at the time included the Mediterranean Expeditionary Force, the force in Egypt and the force in Salonika. The two first named were independent commands, the Salonika force being administered by the M.E.F., which also included the Australian and New Zealand forces.

The veterinary services of the various forces differed considerably in organization, and the Director of Veterinary Services proceeded with the adoption of universal organization and co-ordination on the assumption that at some period the whole of the forces might come under a central authority, and that all units, except such as would eventually be required for permanent service in Egypt, might at any time be ordered to France, and should therefore possess the same basis of Army Veterinary Corps organization as obtained there. If on the other hand units were sent to other places, it appeared simpler to make such necessary alterations as might be required by local conditions from that basis than from any other. The loyal co-operation of the veterinary officers of all ranks and services made the adaptation of the work a simple procedure.

The distribution of officers, Army Veterinary Corps and veterinary units, and the approximate number of animals at this time were as follows :—

	Officers.	No. of Animals.	Veterinary Hospital for 1,000 Cases.	Veterinary Hospital for 250 Cases.	Convalescent Horse Depot.	Base Depot Veterinary Stores.	A & B Veterinary Stores.
M.E.F. { Cape Helles ..	11	9,921	—	1	—	—	—
{ Anzac ..	2						
{ Suvla ..	5						
{ Mudros ..	4	1,875	—	—	—	—	1
{ Alexandria ..	36	10,769	1	1	1	1	—
Cairo and Canal Defence Force	{ 62	—	1*	4	—	1	—
.. ..	10	42,600	—	—	—	—	—
Salonika	18	7,159	1	1	—	1	—
	148	72,324	3	7	1	3	1

* No personnel of its own.

To ensure efficiency in the administration of the veterinary services the following proposal was submitted in the autumn of 1915 to the G.O.C. for transmission to the War Office :—

1 Director Levant Base.

1 Deputy Director Levant Base.

1 D.D.V.S. Egypt. 1 D.D.V.S. Salonika. 1 D.D.V.S. M.E.F.

3 A.D.V.S. Egypt. 1 A.D.V.S. Salonika. 1 A.D.V.S. M.E.F.

(a) Cairo district.

(b) Ismalia district.

(c) Alexandria district.

In the meantime the evacuation of Gallipoli had been decided on, and the concentration and subsequent reorganization of the Mediterranean Expeditionary Force in Egypt led to a modification in these appointments. War Office sanction was, however, given for the appointments in Salonika and Egypt; Colonel F. Eassie being appointed to the former, and Colonel G. M. Williams to the latter.

The 10th and 28th Divisions from the Mediterranean Expeditionary Force were sent to Salonika from Gallipoli, and prior to despatch their inefficient animals were transferred to veterinary hospitals in Egypt. The Salonika force was afterwards strengthened by the arrival of the 22nd, 26th and 27th Divisions from the United Kingdom and by a mounted brigade from Egypt.

The following table shows the divisions and troops which were concentrated in Egypt in 1915 and 1916 and their ultimate disposal:—

Formation.	Service.	Destination after Refitting.	Date in 1916.
Royal Naval Division.	M.E.F. .. ..	.. ..	March 16th.
11th Division ..	.. ..	B.E.F. France	
13th Division ..	.. ..	Mesopotamia ..	February 24th.
29th Division ..	.. ..	B.E.F. France ..	March 16th.
31st Division ..	.. ..	B.E.F. France ..	February 24th.
42nd Division ..	.. ..	B.E.F. France	
52nd Division ..	.. ..	E.E.F.	
53rd Division ..	.. ..	E.E.F.	
54th Division ..	.. ..	E.E.F.	
1st Australian ..	.. ..	B.E.F. France ..	March 23rd.
2nd Australian ..	.. ..	B.E.F. France ..	March 16th.
3rd Australian ..	Australian ..	B.E.F. France ..	June.
4th Australian* ..	Egypt ..	B.E.F. France ..	June.
N.Z. Division ..	M.E.F. ..	B.E.F. France ..	April 12th.
Anzac Mounted Division.†	.. ..	E.E.F.	
2nd Mounted Division.‡	.. ..	E.E.F. ..	January 28th.
Western Frontier Force.¶			
Fayoum Force§ ..	Miscellaneous Units from the Mediterranean Expeditionary Force and Force in Egypt.		March 30th.
Canal Defence Force	9th Brigade (3rd Lahore Division). 10th Indian Division.|| Imperial Service Cav. Bde. Bikanir Camel Corps. Grantee Camel Corps.	B.E.F. France .. E.E.F. E.E.F. E.E.F.	March.

* Formed in Egypt from 1st and 2nd Australian Divisions and reinforcements from Australia.

† Formed from 1st, 2nd, 3rd Brigades Australian Light Horse and New Zealand Mounted Brigade.

‡ Formed into Dismounted Brigades.

¶ Miscellaneous units from formation of Mediterranean Expeditionary Force and Force in Egypt.

§ Absorbed in Western Frontier Force.

|| Broken up March, 1916.

In addition to the above there were the following lines of communication units:—

The Indian Mule Cart Corps (returned to India); the Zion Mule Corps (disbanded); the Camel Transport Corps; two remount squadrons in Salonika, three remount squadrons in Egypt.

After leaving Gallipoli, the Dardanelles army was in a seriously disorganized state and in urgent need of refitting. There were large drafts of reinforcements to be distributed and trained, and recovered sick and wounded to be absorbed. All animals required careful inspection, the inefficient to be evacuated to veterinary hospitals and replaced by fit animals from remount depots. Every day for six weeks shiploads of troops, guns, animals and transports arrived at Alexandria and Port Said, and new brigades, divisions, army corps and commands were continually formed or reorganized.

The force was then divided into three formations :—

1. Mediterranean Expeditionary Force for the defence of Egypt from the East.
2. British Force at Salonika.
3. Force in Egypt for the defence and maintenance of order in the Nile valley, and for defence from the West.

As soon as these formations had been reorganized and refitted, orders were received for a redistribution of various divisions to other theatres of war. The embarkation of troops for France, Mesopotamia and Aden commenced in February and continued without intermission until the end of April. During this period the strain on all administrative services was particularly heavy.

By the middle of March, 1916, a satisfactory solution had been found for the complicated relations between the force in Egypt, the Levant Base, and the Mediterranean Expeditionary Force. Unity of control was now established by the absorption of the three forces into one command, which was designated the Egyptian Expeditionary Force, and ultimately included the following veterinary officers :—

A.D.V.S.

42nd Division	..	..	..	Lieut.-Colonel T. Marriott (A.V.C., retired list).
52nd	..	..	..	Major J. Adamson, A.V.C., T.F.
53rd	..	..	..	Major S. J. Williams, A.V.C., T.F.
54th	..	..	..	Major D. R. C. Tennant, A.V.C., T.F.
Anzac Mounted Division. 1st, 2nd and 3rd Australian Light Horse and New Zealand Mounted Brigades.				Major J. Kendall, A.A.V.C.

The veterinary administrative appointments were :—

- | | | | | | | |
|--|----|----------------|---------|----|----|---|
| (a) G.H.Q. | .. | .. | Ismalia | .. | .. | 1 D.V.S. Brigadier - General E. R. C. Butler. |
| (b) I.G.C. | .. | .. | Cairo | .. | .. | 1 D.D.V.S. Major (temporary Lieut.-Colonel) A. G. Todd. |
| (c) Eastern Force | .. | (Under G.H.Q.) | | | | |
| (d) Australian and New Zealand Forces. | .. | .. | .. | .. | .. | 1 D.D.V.S. Lieut.-Colonel E.A. Kendall, A.A.V.C. |
| (e) G.H.Q. | .. | .. | .. | .. | .. | 1 A.D.V.S. Major E.P. Argyle, A.V.C. |
| (f) Western Force | .. | .. | .. | .. | .. | 1 A.D.V.S. Lieut.-Colonel W. D. Gunn, I.C.V.D. (retired pay). |
| (g) Alexandria District | .. | .. | .. | .. | .. | 1 A.D.V.S. Major N.P. Walsh, A.V.C. |

The D.V.S., M.E.F. (Colonel E. Taylor), and D.D.V.S., Force in Egypt (Colonel G. M. Williams) now became surplus to requirements and embarked for the United Kingdom.

The Salonika force was under the command of the C.-in-C., E.E.F., and consisted of five divisions and one mounted brigade, and there was one D.D.V.S. and one A.D.V.S. with headquarters.

Towards the end of 1916 the D.Q.M.G. recognised the desirability and approved of all administrative officers other than those of divisions being shown as belonging to directorates instead of to the staff of formations. The advantage of this was that appointments were not necessarily abolished when reorganization took place, and the Director was at liberty to employ officers where required.

On October 23rd, 1916, the C.-in-C. moved general headquarters to Cairo, and the eastern force of the E.E.F. came into existence with headquarters at Ismalia, while the headquarters of the I.G.C. in Cairo were merged into General Headquarters. The D.V.S. accompanied general headquarters to Cairo, and the D.D.V.S. became attached to the headquarters of the G.O.C. the Eastern Force.

Mobile Veterinary Sections.

The undermentioned divisions and mounted brigades were originally despatched from England to Egypt without mobile veterinary sections :—

42nd (E. Lancs.) Division.	Highland Mounted Brigade.
53rd (E. Anglian) Division.	Scottish Horse Brigade.
54th (Welsh).	South Eastern Brigade.

Soon after the evacuation of Gallipoli the Royal Naval Division was disbanded and its mobile veterinary section (No. 19), which consisted of regular personnel, was transferred to the 42nd Division T.F. This division was under orders to take part in active operations in the Sinai desert and was in urgent need of a mobile veterinary section, but to await its formation, training, and despatch from the United Kingdom was not considered justifiable in the circumstances. With regard to the policy to be adopted in the other formations it was decided to complete the 53rd and 54th Divisions from the United Kingdom and France, and to reorganize the mounted brigades into dismounted brigades of infantry to make up the 74th Division. The mobile veterinary sections were made up to establishment and re-equipped for immediate duty in the desert.

The number of veterinary officers of all ranks in Egypt and Salonika, after the evacuation of Gallipoli, was as follows :—

A.V.C.

Regulars	..	..	..	21
Special Reserve A.V.C.	..	..	..	7
Territorial Force	..	..	..	35
Temporarily Commissioned	..	..	..	54
Australian A.V.C.	..	..	..	50
New Zealand A.V.C.	..	..	..	13
Retired Pay I.C.V.D.	..	..	..	2
Local Rank..	..	..	..	2
Quartermasters A.V.C.	..	..	..	4
				<hr/> 188

There was not a sufficient number of senior regular officers to fill all the administrative appointments and to take command of the hospitals, as several officers, including the administrative veterinary officers of the 11th and 13th Divisions, had been invalided home, and only a proportion of executive veterinary officers had been sent out with the 53rd and 54th Divisions T.F. The paucity of officers was accentuated by the need for regular officers for purchasing camels in the Sudan. The military situation, however, was not serious, and the difficulty was overcome by selecting and training officers of the Special Reserve and the Territorial Force for junior administrative appointments and for the commands of hospitals in Egypt and Salonika. This arrangement made it possible for regular officers to be detailed for the senior appointments in the British divisions which left for France or Mesopotamia.

The situation in so far as executive veterinary officers were concerned was also critical. The period of engagement for temporary officers who joined on the outbreak of war was for one year, and several of these, who were serving in Egypt, had now completed their engagement. None of them had expected to be sent further from home than France, and they were unwilling to re-engage unless they were allowed to proceed to the United Kingdom to attend to their financial and family affairs, which in some cases had become much involved. Some of the Special Reserve and Territorial Force officers were similarly situated and were applying for urgent leave to England.

This difficulty was represented to the War Office, and it was suggested that the exchange of a proportion might be arranged with officers of similar rank and capacity serving in France, so that the incidence of foreign service would be more evenly distributed and those who had been abroad for more than a year would have a better chance of getting home to attend to their private affairs. After due consideration a decision was received from the War Office to the effect that the general exchange of departmental officers serving in the Near East with those at home or in France was not feasible, but that help would if possible be given in individual cases of hardship. In the circumstances several temporary officers had to be sent home, and a few territorial officers were allowed limited leave. This was possible only because the military situation in Egypt was not serious at the time. Sixteen officers were sent out from the United Kingdom to replace deficiencies, but even with these there was a paucity owing to the expansion of the force and the formation of the Camel Transport Corps. The Director General of the Army Veterinary Services, in response to applications, had informed the D.V.S. of the extreme difficulty he had in meeting urgent demands for officers in other theatres of war, and consequently recourse was had to the employment of Egyptian graduates of the Cairo Veterinary College, who were appointed to the Camel Transport Corps. They were paid at the rate of £14 per month with rations, and were graded as Malazim Aival (1st Lieut.), and after one year's service were granted

an increase of pay of 2s. a day, whilst those who were lent to the army by the Egyptian Government were granted an increase in their allowances. More extensive use was also made of N.C.Os., A.V.C.

The services of Mr. F. E. Mason, F.R.C.V.S., the veterinary pathologist to the Ministry of Agriculture, Egypt, had been frequently utilised in connection with military animals since the commencement of the war, and as these duties took him into camps in the zone of operations he was graded as a major under Field Service Regulations, Part II, without pay and allowances, and with permission to wear uniform. This officer could not be given a temporary commission as his services were also required by his own government, which was good enough to place its excellent laboratory at the disposal of the army. Some thousands of specimens were examined and reported on by this officer, who continued to make frequent visits to various parts of the country to investigate outbreaks of disease in army animals.

Towards the end of 1916 the frontage of the force had been considerably increased, resulting in a wide distribution of the various units; and this, combined with a further expansion of the Camel Corps, fighting and transport, put a particularly heavy strain on the depleted veterinary service. Divisions had now 4,000 camels in addition to their horses and mules, and, although veterinary establishments were kept as complete as possible, in one division only was the full establishment possible, whilst none of the veterinary hospitals had their full complement of officers.

During 1916 the expansion of the capacity of existing veterinary hospitals from 250 cases to 1,250 cases, the formation of the Camel Transport Corps, camel hospitals, and the Imperial Camel Corps, and the provision of N.C.Os. for units in the field absorbed over 200 N.C.Os., of whom 160 were provided from A.V.C. personnel in Egypt. Suitable men were selected for these duties from the field units as well as from veterinary hospitals, and received a course of training which embraced lectures and practical courses in:—

Stable management in Egypt.

Management of animals in camp.

Effects of climate and water on the health of animals.

Foods and feeding.

Prevention of disease and injuries.

First aid.

Veterinary equipment available in the field.

The keeping of case books and the compilation of returns.

The N.C.Os. for units in Territorial Force Divisions were selected from mobile veterinary sections in the field, and demands for the balance to complete establishments were submitted through D.A.G. 3rd Echelon to the War Office.

When regular or Territorial Force N.C.Os. arrived from the United Kingdom they were posted to veterinary hospitals in Egypt for a fourteen days' course of instruction in stable management peculiar to the country, before being detailed for duty in the field.

N.C.Os. for camel units or veterinary hospitals were selected from volunteers and sent to camel veterinary hospitals for training, their names being kept on a separate roster.

Promotions were brought into line with those in the British Expeditionary Force by the submission of monthly seniority lists, and close touch was maintained between the Directorate and the 3rd Echelon. At first the promotions were made to paid temporary rank, but later to unpaid acting rank to complete war establishments or while performing veterinary duties with units.

Sickness among the men was always a serious consideration, and in July, 1916, 132 were in hospital. The older men found the climate very trying, and the War Office was asked to take this into consideration in sending out reinforcements. There were no facilities for personnel leaving the country for home furlough as in the B.E.F., and the best that could be done was to allow one-sixteenth of the establishment of each unit, for one week, between June and September, to proceed to Alexandria where the heat was less severe and where there were facilities for sea bathing and other recreations. They were accommodated in No. 18 Veterinary Hospital at Mustapha Camp and were relieved of all duties during their furlough.

Owing to the inability of the Army Service Corps to meet the clerical requirements of the veterinary service, clerks were obtained from combatant units. This led to protests from G.Os.C. concerned, and ultimately men were obtained from veterinary units and trained in clerical duties. The clerical establishment of the veterinary directorate had to be increased to one warrant officer, one serjeant, one lance-serjeant, two corporals, one lance-corporal and four privates to deal with the additional work. All D.A.Ds.V.S. of divisions, hospitals, depots of veterinary stores and mobile veterinary sections required men with clerical knowledge, and no definite provision existed for such men. The consequence was that men taken as clerks had small chance of advancement. This was represented to the War Office, who were asked to consider the establishment of a clerks' section in the corps, and although this proposal did not meet with approval at the time, a clerical establishment was sanctioned on the termination of the war.

A certain number of shoeing-smiths for veterinary hospitals on expansion and for units in the field was provided from among men who had been intensively trained in veterinary hospitals. Sufficient volunteers were not, however, forthcoming to meet all requirements, owing to the fact that special artificer rates of pay were not granted to trained men, so that the balance required had to be obtained from the United Kingdom. The Australian Light Horse regiments were short of shoeing-smiths and detailed for training men who were particularly apt in learning their new trade. After the reorganization of the yeomanry into dismounted brigades, five of the senior yeomanry farriers were surplus to requirements, and permission was given for them to be employed in the veterinary hospitals until required elsewhere.

Veterinary Hospitals.

Late in the year 1915 some change was necessitated in the arrangements for accommodating and disposing of sick horses, more especially as a great increase in the number of sick animals was to be expected from the Gallipoli area, following the evacuation of the peninsula and the reorganization of the force.

No. 11 Veterinary Hospital in Alexandria was located at the corner of Camp "A," which was fully occupied by various other troops. Sick horses were separated from those of the neighbouring units by a rope only, and from time to time adjoining portions of ground were given or taken away according to the number of animals for which accommodation had to be found. In the event of an outbreak of contagious disease, or a sudden influx of sick, this arrangement was far from satisfactory.

A detachment of No. 11 Veterinary Hospital and No. 24 Mobile Veterinary Section (under orders to proceed overseas) were located in Zaharieh Camp, which was also occupied by details of several divisions. No. 18 Veterinary Hospital was located at Camp Mustapha, well situated and not in immediate contact with other units, the animals being accommodated in stables and temporary shelters, but the site was suitable for a small hospital only.

After an inspection of various camps and villages in Egypt it was eventually decided to locate veterinary hospitals at Alexandria, Quesna, Bilbeis, and Cairo, and convalescent horse depots at Alexandria (Mex Camp), Cairo and Bilbeis. The first named was not proceeded with owing to a change in the animal strength of the force which took place before it could be built.

In December, 1915, there were over 44,000 horses and mules in Egypt; of these, 4,800 (11·0 per cent.) were sick, and this number was expected to increase during the hot weather or if active operations were undertaken. Owing to insufficient accommodation only 3,450 of the animals could be dealt with in veterinary hospitals and convalescent horse depots, and 1,350 had to be left with units.

It was estimated that seven veterinary hospitals for 1,000 cases would be required for the forces in the Near East. No. 15 Veterinary Hospital (for 1,000 cases) and No. 17 Veterinary Hospital (for 250 cases) were in Salonika, and Nos. 11, 20 and 21 Veterinary Hospitals (for 1,000 cases each) with No. 18 Veterinary Hospital (for 250 cases) were in Egypt, and No. 16 Veterinary Hospital (for 250 cases) was on the way to Egypt from Gallipoli.

The Australian veterinary hospitals and two New Zealand veterinary hospitals for 250 cases each were at the time located in the Cairo district, but these were not included in the above estimate as their absorption to form mobile veterinary sections for the reorganized Australian and New Zealand armies was under consideration. As the Salonika force had already been provided with one of the veterinary hospitals allotted to the Mediterranean Expeditionary Force, and there was a scarcity of forage in Greece,

it was decided to send all debility cases to Egypt and to retain Nos. 20 and 21 Veterinary Hospitals in Egypt.

Pending sanction being given to the expansion and building of veterinary hospitals, improvised arrangements were made to relieve units of the encumbrance of sick animals. One of the mobile veterinary sections of the 2nd Mounted Division was formed into a small stationary hospital at Mena Camp by the employment of Egyptian syces and the issue of camp equipment on temporary loan. A set of hospital chests which had been sent from India with the 10th Indian Division was utilised for the treatment of the more serious cases.

Approval was obtained for the employment of Egyptian syces in Australian veterinary hospitals when the number of patients exceeded the establishment, which allowed one syce to three horses and one jemadar for every thirty syces. They were paid at local current daily rates approved by the G.O.C., and were engaged and discharged according to the number of animals under treatment.

In order that the expansion in veterinary requirements might be carried out expeditiously and on the most economical scale it was proposed to utilise the European personnel, A.V.C., already serving in the country and to employ Egyptian labour to the fullest extent in the veterinary hospitals and convalescent horse depots. War establishments and mobilisation store tables were drawn up on this basis and submitted to the G.O.C. for War Office approval.

In the meantime orders were received from the War Office to the effect that all veterinary hospitals in Egypt should be organised to deal with 1,250 cases each. The necessary modifications were accordingly made in the war establishments and store tables, and were subsequently approved by the War Office, who left the expansion or amalgamation of the smaller hospitals to the discretion of the G.O.C. In these circumstances the expansion of Nos. 11, 20 and 21 Veterinary Hospitals was proceeded with in January, 1916, Nos. 16 and 18 Veterinary Hospitals in March, and No. 17 Veterinary Hospital in Salonika was reorganized in April to deal with 1,000 cases. The greater part of the surplus European personnel accruing from the changes in Egypt was sent to veterinary hospitals in Salonika, which were organized on a European basis, and the remainder, forming a nucleus for reinforcements, were attached to No. 18 Veterinary Hospital, Alexandria, which acted as a depot for the Near East.

Egyptians formed approximately 75 per cent. of the establishment (see Table "A").* Although most of these men knew little about grooming and horse management when first engaged, they became fairly proficient under patient training and supervision. Such labour was plentiful, and the replacement of the sick and inefficient individuals presented no difficulties, as they invariably took their discharge. The former remained at their homes until fit for duty and then re-enlisted. The daily rates of pay were $5\frac{1}{2}$ piastres for jemadars and $4\frac{1}{2}$ piastres for syces (1 piastre = $2\frac{1}{2}$ d.), without

* See page 273.

rations, accommodation or clothing, so that the cost of each hospital was very much lower than that of hospitals in which only British personnel was employed.

In July, 1916, the number of sick horses in Salonika had increased to 3,000, and the G.O.C. represented the necessity for an additional veterinary hospital. As it was deemed advisable to take this opportunity to put all veterinary hospitals on the same war establishment, this proposal was submitted to the Home authorities together with a request that the special Salonika scale, viz., war establishment for 1,000, should be abolished. The War Office was unable to meet the demand, and issued instructions for No. 18 Veterinary Hospital at Alexandria to be sent to Salonika. At this time there was a sick list of 11,000 animals in Egypt, and the loss of a hospital was not only a great inconvenience but also a severe strain on the veterinary service, as the construction of the third convalescent depot at Bilbeis had been suspended. The hospitals had been reorganized on the Egyptian scale of establishment, and all surplus European personnel had been sent to Salonika. Further, No. 18 Veterinary Hospital was acting as the depot for reinforcements for the Near East, the duties of which took up the whole time of one officer, one staff-serjeant, and one clerk.

No. 18 Veterinary Hospital, with its European establishment, embarked for Salonika on July 27th, the sick under treatment being transferred to Nos. 11, 20 and 21 Veterinary Hospitals. It was then decided to convert No. 1 Convalescent Horse Depot into a veterinary hospital for Alexandria, which was greatly in need of such a unit since it was the base port for practically all transports arriving or leaving the country. The new hospital, designated No. 26, was formed early in August, and although somewhat of a skeleton at first, was gradually completed as reinforcements became available.

The lack of railways and roads in Salonika in 1916 led to an increase in the transport animals of the force, and instead of 6,000 animals for each division the number increased to about 10,000. The transfer of debility cases to Egypt was found to be impracticable owing to submarines and the scarcity of horse transports. From various causes, to which reference is made elsewhere, the sick rate had been steadily increasing, and although the veterinary arrangements had primarily been well organized and were sufficient, they now required expansion to deal with the increased strength. This need was duly represented to the War Office who issued instructions for No. 11 Veterinary Hospital, which was now established at Quesna, to be sent to Salonika. There were 1,229 animals under treatment when the instructions were received, and Nos. 16, 20 and 21 Veterinary Hospitals had their full complement of cases, while No. 26 Veterinary Hospital in Alexandria was dealing with 2,526 cases. The sick animals were distributed between Nos. 16 and 20 Veterinary Hospitals on November 13th, and No. 11 Hospital embarked without its Egyptian personnel at Alexandria.

Fortunately by this time accommodation arrangements in all hospitals had been expanded in anticipation of an increase in the number of sick animals in Egypt, and a serious difficulty was thus surmounted. After the departure of No. 11 Veterinary Hospital the distribution of sick in Egypt was as follows :—

No. 16 Veterinary Hospital	..	1,284	cases.
No. 20	„	1,789	„
No. 21	„	1,533	„
No. 26	„	2,136	„
C.H.D., Maadi	..	1,256	„

Convalescent Horse Depots.

The convalescent horse depot in the Alexandria military area was located at Mex and was well separated from other units. Its establishment, which included 180 Egyptian jemadars and syces, is shown in Table "B."* The large number of debilitated animals in the force made it necessary to form another of these units as early as possible in the Cairo district. A suitable site for it was selected at Helmieh, which had railway facilities within easy reach, natural shade and an excellent water supply. Unfortunately there was difficulty in making the necessary arrangements with the owner for the occupation of this site, and as the Australian Light Horse regiments were under orders to proceed from Maadi to the canal area it was decided to utilise their camp and to erect fencing around their horse shelters to form suitable kraals. Maadi is nine miles to the south of Cairo and in close proximity to the river Nile, which in addition to giving abundant supply of water to the depot irrigates a large acreage of land in the vicinity and provides almost unlimited green food for the patients under treatment. This depot received its first batch of patients on March 3rd, 1916, and continued to function at Maadi until the end of the war.

The expansion of the Australian and New Zealand forces into two corps of three divisions each, and the provision of mobile veterinary sections and veterinary N.C.Os. for field units in accordance with war establishments, entailed a reorganization of their veterinary services. It was decided that Australia and New Zealand could not provide lines of communication establishments as well as field units, so the two Australian and the two New Zealand veterinary hospitals (for 250 cases each) which accompanied the force to Egypt in 1915 were disbanded, and the personnel was absorbed in the formation of eleven mobile veterinary sections for the Australian force, six of which were for the infantry divisions proceeding to France and five for Australian Light Horse and New Zealand Mounted Brigades remaining in Egypt. N.C.Os., A.V.C., both British and New Zealand, were trained and allotted to field units, the balance of the personnel being utilised for reinforcements. As the New Zealand hospitals only had to provide two mobile veterinary sections and N.C.Os. for one infantry division, they had a larger surplus of privates than the Australian veterinary hospitals, and

* See page 274.

after a sufficient number had been retained for reinforcements the remainder were allowed to volunteer for other New Zealand units.

Lieut.-Colonel E. A. Kendall, A.A.V.C., was appointed D.D.V.S. at the Australian base headquarters in Egypt on February 24th, thus bringing the Australian veterinary service into line with others as regards representation at headquarters. He took an active part in the reorganization, and was ordered to proceed to the Australian headquarters in London in May, 1916.

Field Veterinary Detachments.

The nearest veterinary hospitals were located within a day's journey by train from the canal zone, but on the advance of troops into the Sinai desert, owing to the wide extent of ground over which active operations had to be conducted, the journey of the sick to veterinary hospitals occupied two or three days, involving two rail changes at Kantara and Ismalia respectively. These circumstances necessitated the introduction of two new veterinary units for the performance of duties analogous to the casualty clearing stations of the medical service.

Improvised arrangements were first made to carry out these duties by transferring No. 7 Veterinary Hospital, Australian Imperial Forces, from Cairo to Moascar in February, 1916, and locating No. 6 Mobile Veterinary Section, 1st Australian Light Horse Brigade, at Kantara. The former was replaced by No. 1 New Zealand Veterinary Hospital, and this, on disbandment, was replaced by a detachment of No. 21 Veterinary Hospital, Bilbeis. The title of field veterinary detachment was adopted to distinguish these units from existing field and lines of communication units. The establishment of a field veterinary detachment is shown in Table "C."*

Camels.

The use of camel pack transport in Egypt was extensive and greater than in any other theatre of war, the sand of the desert rendering the use of any other form of transport impossible.

When it was decided to reorganize the transport of units on a pack basis, the D.V.S. represented to the G.O.C. Levant Base that in all previous camel campaigns mangle and sore backs had occasioned grave inefficiency, and that these conditions were often aggravated by sudden alteration of the methods which generations had proved to be best adapted to the animals' needs and to the performance of their work. Attention was drawn to the fact that camels can only work successfully in their own type of country; that is to say, a delta camel could not be expected to sustain desert work if it entailed long and repeated absences from water.

The estimate given by the general staff for requirements was:—

10,000 as a minimum for the Camel Transport Corps in January.

30,000 by the end of February.

50,000 by the end of June.

* See page 275.

The camels were to be obtained from Egypt, the Sudan, Somaliland and India.

When purchasing operations had been well established it was realised that the supply was not equal to the demand, and that to obtain even 70 per cent. of the requirements a lower standard of fitness would have to be accepted.

In Egypt, 60 to 70 per cent. of the camels suffer from chronic sarcoptic mange for the control of which there is no legislation, and 50 per cent. were known to suffer from sore backs caused by carrying excessive loads and by badly fitting saddles. But as the need for camels was so pressing it was reluctantly decided to purchase camels only slightly affected in these respects, and to place them under treatment in the depot of the Camel Transport Corps or the Camel Veterinary Hospital, according to the degree of the disability, and to issue them for duty when cured. (Between January 1st and March 31st, 1916, 16,067 camels, mostly affected at the time of purchase in Egypt, were admitted for treatment for mange.)

In view of the appalling losses from mange in camels in previous campaigns the decision to purchase animals already affected was a bold one, but it was justified by the military situation and was based on the advice of the Director of Veterinary Services, which was to the effect that with adequate veterinary personnel and a free hand in the treatment the disease could be kept sufficiently under control to enable the camels to be utilised on service. It is the only example on record of animals affected with contagious disease being deliberately and knowingly bought for the purpose of a campaign, and, under any control but veterinary, the army would have had a heavy price to pay for the departure from all previous experience. As events proved, the acceptance of this advice by the General Officer Commanding-in-Chief solved in no small degree the transport problem of this difficult campaign.

At the end of January, when the question was first considered, the D.V.S. recommended the following minimum requirements from a veterinary point of view :—

1. The possession of four permanent teeth sufficiently advanced to allow of the animals grazing on the desert shrub.
2. Capacity to carry 300 lb. at continuous daily work for three months.
3. Freedom from elbow brushing, injury to the back, or mange of such an extent as to interfere with the performance of the scale of work laid down in (2).

Although this standard was considered low, it failed to produce the required number, and it had to be reduced still lower later in the year, as of the camels purchased only 75 per cent. were fit for immediate service. The purchase of female camels was considered in the spring, but as that was the breeding season it was deferred until late in the summer, when 2,000 barren females were bought and posted to one company. With the exception of a few cases, which were mostly from the western desert, these camels gave

complete satisfaction. In spite, however, of all efforts, the camel strength of the E.E.F. (including over 2,000 of the Indian Camel Corps) in 1916 never exceeded a total of 37,000.

The formation of the Camel Transport Corps and the Imperial Camel Corps was a tremendous strain on the veterinary service in Egypt, for, in addition to being called upon to provide and train personnel for the sick and inefficient, demands were made on the force to provide A.V.C. officers for purchasing duties in the Sudan and Somaliland. The few regular officers with camel experience, who would at this time have been invaluable to the force for administrative duties with camel formations and for the command of camel hospitals, were absorbed for the purchase of camels. It was only by the sympathetic and ever willing help of the Ministry of Agriculture and of the Ministry of the Interior that many serious difficulties in connection with the veterinary arrangements for camels were overcome. The greater part of the staff of the European and Egyptian veterinary officers of the above Ministries was placed at the disposal of the army, and the directors of these services (Mr. W. Littlewood, M.R.C.V.S., and Mr. A. E. Branch, F.R.C.V.S.) helped the veterinary service in every possible way.

Camel remount depots were not formed until November, 1915, and all camels purchased prior to that date were concentrated in the Camel Transport Depot at Ein-el-Shams, a small village on the edge of the desert, a few miles east of Cairo. Major (afterwards Colonel) C. H. Whittingham (R. of O.), who had commanded a camel regiment during his service with the Egyptian army, was appointed inspector of the corps and superintended the formation of the various companies. A few of his fellow officers had had previous experience of camels, but hundreds of officers, N.C.Os. and men without previous experience were selected from all branches of the service and trained in their new duties at this depot. Captain A. de R. Gordon, M.R.C.V.S., of the veterinary staff of the Board of Agriculture, who was in command of the veterinary hospital at Abbassia, was appointed senior veterinary officer to the Imperial Camel Corps and granted the temporary rank of major. Subsequently, this officer was appointed A.D.V.S. to the Camel Transport Corps, with the temporary rank of lieutenant-colonel.

Camels arrived at the depot with nothing but a head collar in a poor state of repair. Saddles were not available, and it was impossible to produce the number required because of the scarcity of seasoned wood. Further, it was desirable to take time to adopt a practical uniform type of saddle in various sizes to stand the strain of strenuous campaigning and adaptable to varying requirements before manufacture on a large scale was ordered. As, however, the immediate needs were pressing, 10,000 saddles, mostly in a bad state of repair, but made of hard seasoned wood, were purchased with the camels from their owners. Numerous Egyptian saddlers had to be employed to repair these, after which they had to be fitted to the camels before they were transferred from the depot to

companies. Uniform pattern head collars, girths, breast-plates, loading ropes, rugs, feed sacks had also to be designed, manufactured and bought with as little delay as possible, and pending their issue improvised material of all kinds was used. In addition to this strenuous work, the clipping and dressing of mange cases, wounds, etc., were in progress from early morning till late at night. Although most of these details are not strictly veterinary, they are indirectly related to the casualties which were bound to occur in a service so hastily organized.

The fact that six companies, each with 2,030 camels, were formed for immediate service between December, 1915, and March, 1916, may give an idea of the amount of administrative work that was performed at this period.

The veterinary personnel attached to each company was as follows :—

1 Egyptian veterinary officer.

25 Termegis (Bedouin camel men engaged and trained as veterinary dressers).

In April, 1916, orders were given for the formation of six more companies of the Camel Transport Corps and of a mounted camel company which acted as depot for the training of two battalions of the Imperial Camel Corps. The formation of the latter corps was completed by the end of September, after which a battalion of the Australian and New Zealand Camel Corps was organized, and the whole eventually became the Imperial Camel Brigade.

A considerable increase in the camel strength of the force had to be made to meet these demands, and purchasing operations were renewed, the Sirdar being asked to purchase another 2,000 riding camels in the Sudan. It was now the rainy season in the Sudan—the worst time for the speedy collection of camels—the natives being unwilling to sell, and the camels being widely scattered for grazing. In spite of these difficulties, the Sirdar undertook the formation of a special purchasing organization to meet the demands of the Egyptian Expeditionary Force.

The supply of Egyptian veterinary officers was now exhausted, and the force was below its establishment of European veterinary officers. Consequently, suitable men were selected and sent to camel hospitals for training as N.C.Os., and a proposal was submitted to appoint a N.C.O. with the rank of sergeant with each section not provided with a veterinary officer. This was approved and was eventually found to be conducive to greater efficiency in companies widely scattered during operations.

The veterinary establishment for the Imperial Camel Corps consisted of two veterinary officers for the brigade and one sergeant A.V.C. for each company. The veterinary equipment consisted of one officer's chest and wallet and two unit chests. On the altered establishment this equipment was changed to one veterinary wallet and one unit chest for each N.C.O. The chloral balls hitherto issued in the latter were excluded, and a brass syringe and probe

were added. Companies of the Imperial Camel Brigade were provided on the same scale. By the end of 1916 fourteen companies and one depot of the Camel Transport Corps, three battalions of the Imperial Camel Corps, and two camel remount depots had to be formed. Each division had 4,000 camels in addition to their horses and mules, and the demand for N.C.Os. A.V.C. for camel units absorbed over 100 men.

The Imperial Camel Corps was a valuable asset to the mounted troops during operations in the Sinai desert, as the camels were able to go without water for three or four days and in addition carried a supply of grain sufficient for this period. They were found, however, to be slower than horses in moving over heavy sand, and owing to the loud roars and grunts they made when barracking or getting up they had to be kept well in the rear on night marches, especially when halts were made, to avoid warning the enemy of our movements.

From January to December, 1916, the veterinary arrangements for the Camel Transport Corps were supervised by the A.D.V.S., Camel Transport Corps, but after camels had been issued to divisions a change of policy had to be made. The general management deteriorated and casualties became more numerous when the camels were first allotted to divisions, and the Director of Transport desired them to remain under the supervision of the Deputy Inspector, C.T.C. With experience, however, the administrative veterinary officers of divisions had become proficient in giving advice in this respect, and it was considered that with greater responsibility they would improve still further and effect a more satisfactory decentralised control. The matter was referred to the general staff, who decided that when camel transport companies were attached to a division they formed an integral part of the division, and that the general veterinary supervision of the camels, as of all other animals in the division, would be the duty of the A.D.V.S. The veterinary officers attached to the companies would receive their instructions and orders on veterinary matters from the A.D.V.S. of the division, and camel transport companies not attached to a division would be supervised as in veterinary matters by the A.D.V.S., Camel Transport Corps. Eventually the veterinary care of camels in divisions was carried out to the complete satisfaction of all concerned. The efforts of Major Adamson, A.V.C. (T.F.), were specially helpful in maintaining the camels of the 52nd Division in a highly efficient state.

In January, 1916, steps were taken to establish a camel veterinary hospital at Zeitoun, on the outskirts of Cairo. A regular officer A.V.C. was not available for its formation and command, and through the generosity of the Ministry of Agriculture, Egypt, the services of Mr. D. S. Rabagliati, M.R.C.V.S., were obtained for this duty. It was a fortunate selection, for, in addition to his experience of camels and his knowledge of the country, he spoke Arabic fluently and was instrumental in procuring the greater part of the excellent subordinate personnel for the camel veterinary hospitals that were

eventually formed. The subordinate European personnel was selected from veterinary hospitals and put through an intensive course of training in their new duties in the camel hospital. An Egyptian War Establishment* and mobilisation store table, with rates of pay and scales of rations and forage, was drawn up and sanctioned provisionally by the G.O.C., Levant Base, pending War Office approval. The hospital opened on February 10th, and within four days 1,144 patients were admitted for treatment. Authority was afterwards obtained for the rank of major to be granted to the O.C., and the rank of senior staff-serjeant was altered to warrant officer, Class II, to bring it into line with similar units on the lines of communication.

The site for No. 1 Camel Hospital was between Zeitoun and Helmieh, on a piece of ground some 26 acres in extent, about one-third of which was planted with eucalyptus trees, which provided shade for the patients so that it was not necessary to erect sun shelters for the worst cases. The position was about one mile from the Camel Transport Corps depot, alongside the railway, and had its own water supply and was in close proximity to the supply depot.

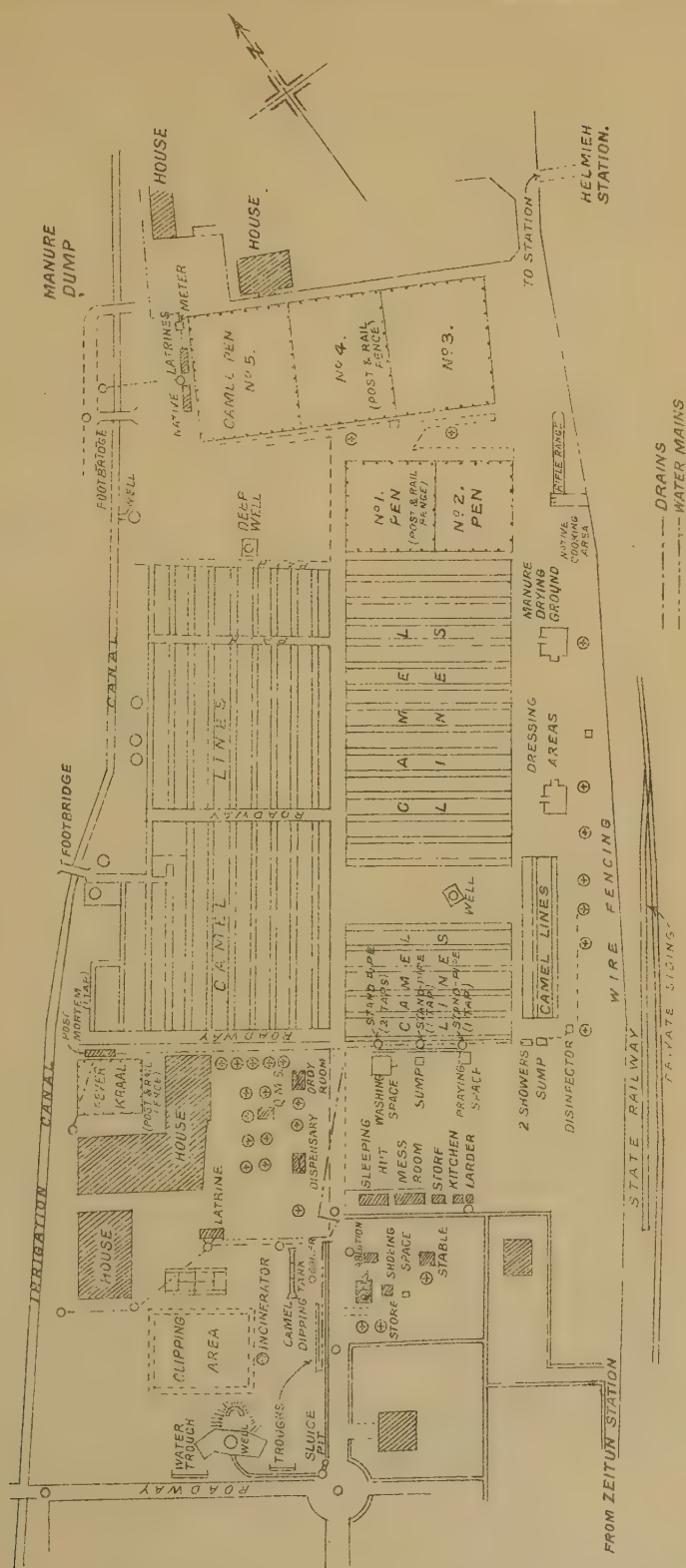
One hospital was soon found to be inadequate, and No. 2 Camel Hospital was formed at Ismalia in March, 1916, under the command of Major H. Mason, whose services were now available owing to the disbandment of the 10th Indian Division. This hospital was situated in the desert on the outskirts of Ismalia, and as there was very little natural shade, temporary sun shelters for 100 camels had to be erected. One section of the hospital was transferred to Kantara West, where there was excellent grazing for camels suffering from debility; and it was also used as a veterinary evacuating unit for sick camels transferred from units operating in the Sinai desert.

In previous campaigns camel hospitals had not been established, and the treatment of camels was carried out in camel sick lines, laid out in the same way as for healthy camels, cases of debility being grazed whenever possible. As there was no grazing near Cairo, the experiment was made of placing these animals in kraals similar to those used for horses and mules. The results were so satisfactory that the detachment of No. 2 Camel Hospital was laid out on this system, and eventually, when the headquarters were transferred to Kantara, it was adopted throughout the hospital. After the elimination of camels that were inclined to be vicious or were in a state of musth, one native on duty in each kraal was sufficient to keep the rest in order.

Towards the end of 1916 a third camel hospital was formed and located in the desert at Bir el Abd, convenient to the railway and in the proximity of the wells and palm trees. It was commanded by Major W. N. Jurgenson, A.V.C. (T.F.), who had been under

* See Chapter XXVI.

**Nº1. CAMEL VETERINARY HOSPITAL,
HELMIEH, EGYPT.**



training at No. 1 Camel Hospital. Egyptian personnel for Nos. 2 and 3 Camel Hospitals was not obtainable locally and had to be recruited in a similar way to that employed with the Camel Transport Corps. At first, the conditions of recruiting were not altogether satisfactory, and the methods adopted had to be radically changed. A conference, at which the D.V.S. attended, was held at Cairo in May to discuss the terms of their engagement, which were decided as follows :—

- (a) A three months' contract, with a short period of leave on full pay, provided that they re-engaged.
- (b) Family compensation in case of death.
- (c) Compensation for injury.

It was stipulated that the men for camel hospitals should be recruited separately and not to a branch of the Camel Transport Corps.

The service was popular with most of the men, as the pay was sufficient to enable them to keep their families and to save money to spend on their leave. A small percentage, however, disliked being away from home, and deserted on leave or refused to re-engage.

Early in the campaign there was no special organization to deal with the evacuation of sick camels from the field to veterinary hospitals, but after the establishment of No. 2 Camel Hospital at Ismalia and Kantara, the A.D.V.S., Camel Transport Corps, arranged for the collection of sick camels at Romani, and parties of suitable strength were sent from No. 2 Camel Hospital to march them to Kantara, where they were classified and placed under treatment. When this hospital became congested, arrangements were made to entrain sick animals in batches of 300 to No. 1 Camel Hospital at Cairo. Owing, however, to the shortage of rolling stock, this system had to be abandoned, and the animals were then marched from Ismalia to Cairo, No. 1 Hospital providing the conducting party. Later in the year one section was taken from each Camel Transport Corps company to form a depot to which all camels requiring rest and treatment were transferred, and they were then inspected by the A.D.V.S., Camel Transport Corps, who selected cases for hospital treatment.

Apart from the few excellent notes on the camel contained in the military handbook entitled "Animal Management," there existed no service publication dealing with the care and management of camel transport for the guidance of the personnel of the hastily organized Camel Transport Corps. The necessity for this soon became apparent and a treatise* on the management of camels was published as an annexure to Routine Orders on April 23rd, 1916. This was subsequently issued to all camel formations in pamphlet form, and elementary veterinary notes on surra, camel pox, mange, coughs, digestive diseases, wounds, bites, sore backs, injuries to the feet, chest pad, and eyes were added for the guidance of N.C.Os. A.V.C. attached to camel companies. The ultimate success attained

* Reproduced in Appendix B 4 of this volume.

in stable management by the Camel Transport Corps was to a considerable extent attributable to the observance of these instructions, the object of which was to enable company commanders to attain uniformity in routine and to make any slight alterations at their discretion to suit local conditions.

The purchasing of camels in the Sudan was controlled by Major F. Fail, who worked in conjunction with the veterinary departments of the Egyptian Army and Sudan Government, commanded by Lieut.-Colonel F. U. Carr, A.V.C., with the assistance of the following officers seconded from the A.V.C. :—

Brevet Lieut.-Colonel J. J. B. Tapley

Major T. Nicholas

Major L. Danel

Major W. F. L. Bright

Captain R. S. Audas

Captain J. J. M. Soutar

Captain W. St. J. F. Macartney

with the addition of Major E. S. Oliver and Captain B. H. Jarvis, A.V.C., who were sent up from the Egyptian Expeditionary Force at the special request of the Sirdar.

In February, 1916, on the arrival of the first consignment of camels from the Sudan, 150 were found to be too young and 300 too debilitated to be of any practical use in the campaign. Owing to the extent of the Sudan and the shortage of officials with knowledge of camels, combined with the fact that the chief camel owners are wandering tribes inhabiting inaccessible parts, great difficulty was experienced in organizing a system of purchasing adequate to the demands of the Egyptian Expeditionary Force. The officers A.V.C. were not numerous enough to purchase and examine camels in all the various parts of the country where these were available, so that the actual purchasing was in many cases carried out by British officials of the Sudan Government Civil Service. After purchase the camels were branded and sent to collecting camps situated in convenient centres where they were carefully examined by A.V.C. officers, and any animals found to be unfit for three months' service in the field were eliminated and resold. This system, when established, worked admirably, and the percentage of unsuitable animals from this source became insignificant.

In Somaliland, camels were purchased by Brevet Lieut.-Colonel W. W. Herring Cooper, A.S.C., Captains F. Roche-Kelly and A. S. Leese, A.V.C. Their first consignment, which arrived at Suez in October, 1916, contained 90 camels not up to standard, but prompt action similar to the organization in the Sudan prevented a recurrence.

Pending the formation of camel remount depots the veterinary service undertook the economical disposal of camels found to be unserviceable either for remounts or veterinary reasons. Weekly auction sales in Cairo were arranged for the disposal of those not considered likely to be of further use within three months, and the

rest were sold to local butchers or knackers, or destroyed. Six hundred (approximately 2·5 per cent. of the strength) from all causes were disposed of by March 8th, 1916, which in the circumstances was not an excessive number.

The scale of forage issued to camels in January was as follows :—

Camels.	Grain. lb.	Millet. lb.	Tibben lb.	Massa Bhoosa lb.	Dries or Hay. lb.	Gur. lb.	Alum. oz.	Salt. oz.
1st Class.								
Indian camels of Bikanir Camel Corps ..	4	2½	8	10	2	1	½	½
2nd Class.								
Egyptian Camels								
Riding ..	—	8	14	—	—	—	—	—
Transport ..	—	8	8	—	—	—	—	—

Equivalents : grain, 1 lb. = millet, 1½ lb.
tibben, 1 lb. = bhoosa, 1 lb.

The millet ration for Egyptian camels proved to be insufficient for the work they were called upon to do and was increased by 2 lb. in May. Later in the year there was a scarcity of millet and, on the recommendation of the D.V.S., observations were made in camel depots as to the use of beans, grain and Indian millet as an alternative ration. After this enquiry the following scale was adopted :—

Beans crushed	..	2 lb.
Millet	.. ..	4 lb.
Gram	.. ..	4 lb.
Tibben	.. ..	12 lb.

As it was not possible to guarantee the stock of beans and gram required it was arranged that a full ration of millet at equivalent rates should be substituted when there was a shortage of these commodities.

The issue of the forage laid down for Indian camels was found difficult to maintain, and when 700 of these animals were transferred to the Imperial Camel Corps in October the C.O. of this unit asked to be allowed to substitute the Egyptian scale of forage. The camels were gradually brought on to this scale with satisfactory results.

The necessity of issuing alum (½ oz. daily) to each camel of the Bikanir Camel Corps was questioned by the Director of Supply and Transport in October. The D.V.S. gave his opinion to the effect that the issue of the alum was merely a fetish with this corps, and he saw no reason for its continuance. The issue was accordingly dropped and no ill consequences arose.

During the reorganization and refitting of the C.T.C. there were no active operations in progress on the eastern front. By February,

1916, unity of control had been established, and shortly after this three infantry divisions and five mounted brigades were moved for offensive and defensive operations to the canal zone, the frontage of which was approximately 90 miles. The problem in this area was now very similar to that which arose in connection with the conquest of the Sudan, but transport and water presented greater difficulties. The provision of water and the construction of roads and railways were vigorously undertaken, and by the end of February patrols and reconnaissances beyond the front line, especially in the northern sector, began in earnest.

The strength of the troops employed varied from one squadron to two brigades, and the objects in view were :—

- (a) To obtain information about the country.
- (b) To locate the enemy, ascertain his habits, capture his forward detachments and stop him from gaining information.
- (c) To ascertain the attitude of local Bedouins.
- (d) To obtain information regarding the water supply, which was always an anxious problem and limited the activity of mounted troops to 15 to 20 miles from railhead.

The constant activity and the trying conditions under which the duties of mounted troops had to be carried out call for special attention, as they were responsible for a comparatively high rate of animal inefficiency which is peculiar to this class of warfare.

Hard desert presents no difficulties to the movement of all arms, including motors, but soft desert, of which the Sinai peninsula east of Romani is mostly composed, has always been a formidable military obstacle. The feet of horses and men sink in it to a considerable depth, making progress extremely slow and exhausting, and in all previous wars it has been found impassable for artillery and wheeled transport. In this campaign iron sand tyres, 6 to 8 in. wide, were tried and overcame the difficulty on hard desert, but were found to be useless on soft sand, so special pedrails had to be fitted to the wheels of guns and ammunition wagons which sometimes made it necessary to use fourteen horses for each team. These pedrails consisted of stout blocks of wood about 1 ft. square and 2½ in. thick held on to the tyres by chains. Camel transport had to be substituted for wheeled transport.

Fifteen miles were considered a long day's march for artillery, and a twenty-five mile march for cavalry, mostly done at a walk, was found to be an exhausting journey. The tropical heat and the prevailing khamsins of the summer months made the work still more exacting. Marches were always begun at night to avoid the heat and to prevent troops from being seen by the enemy, but return journeys had to be made by day on account of lack of water and supplies. On some of these marches the heat was so great that men could not even touch their water bottles, and the rifle barrels became so hot that hands were often blistered in handling them. Often no pace faster than a walk was possible, and to relieve the strain on the horses the men led them for long distances. It was

quite common for the men to collapse from the heat during these marches or to suffer from heat exhaustion afterwards.

The recorded shade temperatures were as under :—

	<i>Maximum.</i>		<i>Minimum.</i>		<i>Mean.</i>	
April	..	105	..	51	..	Not recorded
May	..	113	..	56	..	"
June	..	117	..	63	..	88
July	..	115	..	73	..	91
August	..	109	..	69	..	87.8

Although horses do not suffer from heat to the same extent as men, the above temperature conditions were sufficiently trying for work in the open. In good health and condition, both horses and mules can stand prolonged exposure to a tropical sun and considerable variations of temperature, but, when they are below par, the general vitality is greatly lowered and they rapidly go from bad to worse, making recovery, even under favourable conditions, a slow process.

In addition to being an obstacle to progression, and indirectly leading to injuries of various kinds, sand is a prolific cause of inefficiency from sand colic and debility, which will be discussed under their respective headings.

Work under such conditions was bound to occasion a comparatively high percentage of casualties. The actual wastage through death, destructions and castings was kept low by the early evacuation of inefficient animals to veterinary hospitals, where they revived with an abundance of fresh water and green and other suitable food. During the worst months—March to August—the actual wastage was 1,672, which represented 2.63 per cent. of the average strength of the force (62,810).

The distances covered in some of these reconnaissances are of interest.

Salmana	..	..	..	48 miles in 30 hours.
Bir abu Afein	..	..	..	40 " " 40 "
Bayud	..	..	..	60 " " 32 "
Ge-eila	..	..	..	44 " " 24 "
Mageibra	..	..	..	34 " " 24 "
Bir-el-Abd	..	..	..	40 " " 24 "
Wadi Umm	..	..	..	— " " — "
Muksheib	..	..	..	120 " " 80 "

The Bayud patrol was the most strenuous. On the return of the troops to Katia the temperature in the tents was 120° F., and at El Maler it was 123° F. in the shade, and a khamsin commenced at 9 a.m. and continued till 4 p.m. There were 160 cases of heat exhaustion amongst the men and 70 had to be evacuated to hospital.

Skirmishes with the enemy were frequent, captures of detachments and isolated parties were often made, and camps were destroyed. The enemy's water supplies when not required by our troops were demolished. The enemy's tactics were similar to our own, and on occasions he attacked in considerable strength with heavy guns skilfully handled.

The military operations which took place between March and December, 1916, were as follows :—

March.

E. Front. Reconnaissances and preliminary steps for advance on Katia.
April.

E. Front. Favoured by a thick fog the enemy made a successful raid, capturing two squadrons of the Worcestershire Yeomanry at Oghratina and one squadron near Katia. A counter attack was made, and although seventy of the enemy were killed and thirty prisoners taken we were unable to rescue the Yeomanry. "A" Mobile Veterinary Section of the 5th Mounted Brigade took part in these operations and had one man killed and six missing. The G.O.C. in his report referred to the gallant conduct of the men of this small unit which bore the brunt of the attack in one part of the defences.

The animal losses on this occasion were :—

Warwick Yeomanry	..	..	..	3
Gloucester Yeomanry	..	..	..	108
Worcester Yeomanry	..	..	..	291
2nd Field Ambulance	..	..	..	6
"A" Mobile Veterinary Section	..	..	..	17
Total	..	..	..	<u>425</u>

W. Front. Repeated raids and reconnaissances.

May.

E. Front. Frequent reconnaissances in Nos. 2 and 3 Sections.

W. Front. Reconnaissances by Imperial Camel Corps, Dakla, Beris, Farafra, Bahria, Moghara, Wadi Natrun.

June.

E. Front. Reconnaissances to Bir Bayud (twice), Bir-el-Megeibra and Bir-el-Jefeir (twice), Bir-el-Abd, Hod-el-Ge-ila, Hod-el-Dhaunnin, Hod-el-Mushalfat, and Wadi um Muksheib.

July.

E. Front. Reconnaissance to Abu Zeneima. Reconnaissance to Salmana.

The 3rd Turkish Division advanced and took up a series of entrenched positions extending from Hod-en-Negiliat through Oghratina to Hod-el-Masia.

Our mounted troops were in constant touch with the enemy, harassing him and making valuable reconnaissances, during which there were several skirmishes.

A mobile column of the Imperial Camel Corps was transferred from Egypt to No. 3 Section East Front.

August 3-4.

Battle of Romani. The enemy attacked and tried to outflank our right with infantry which were outflanked by our mounted troops. The attack was pressed back by Anzac Mounted Division and 52nd Division. The Imperial Camel Corps working on the enemy's left flank compelled him to retire to Bir-el-Abd on August 8th.

Our mounted troops were harassed by heavy artillery fire which interfered with the pursuit after the counter attack. Bir-el-Abd was attacked between the 10th and 12th by our mounted troops, but the enemy succeeded in retiring to El Arish.

Result of Operations :—

Enemy casualties estimated at	9,000
Prisoners taken	4,000
4 Mountain guns	} Captured.
9 Machine guns	..	..
2,300 rifles, 1,000,000 rounds of small ammunition	..	..
100 horses	..	..
500 camels	..	..

Horses and Mules.
Died, killed, Evacuated to
destroyed and Veterinary
missing. Hospitals.

Formation.	destroyed and missing.	Veterin Hospit
42nd Division	9	1,500
52nd Division	28	
Anzac Mounted Brigade	826	
5th Mounted Brigade	20	
	<hr/> 883	<hr/> 1,500
		<i>Camels.</i>
Camel Transport Corps	51	300
62nd Camel Corps (Indian)	62	
70th Camel Corps (Indian)	—	
191st Camel Corps (Indian)	4	
	<hr/> 117	<hr/> 300

September.

In No. 1 Section a column of mounted troops and infantry carried out a successful reconnaissance at Bir-el-Tawal, 30 miles west of El Kubri. The enemy's camp was taken, wells were emptied and stores destroyed, but pursuit was impossible owing to the nature of the country.

October.

A reconnaissance to Gebel-el-Rakwa and Maghara was carried out by the Australian Light Horse Yeomanry and Camel Corps, entailing two night marches over exceedingly heavy sand dune country, and a thick fog on the second night increased the difficulties on this occasion.

November.

Mounted patrols kept in constant touch with the enemy's position at El Arish-Masaid. East Force was mainly occupied in making necessary arrangements for pressing forward the advance towards El Arish.

In No. 1 Section a successful reconnaissance was made to Sinn Bisher and Bir-em-Gurf, 30 miles south of Suez.

Railway now reached Mazar and the water pipe line extended to Romani.

December,

Constant patrols.

Mounted troops reorganized into desert column under the command of Lieut.-General Sir Philip W. Chetwode, and headquarters were established at Mazar.

On December 20th the enemy withdrew from El Arish in a southerly direction, and this village was occupied by our troops on December 21st, after a twenty miles night march.

The enemy was located at Magdhaba, and was attacked on the 22nd and 23rd by a column of Australian and New Zealand mounted troops with the Imperial Camel Corps. He was defeated after stubborn resistance, losing 1,300 prisoners, 200 casualties and 4 guns. Our troops returned to El Arish on the night of the 23rd.

The activities of our mounted troops in these operations were strictly circumscribed by the water supply. An extensive reserve had been accumulated at Mazar, but the enemy covered all the available water in the vicinity of El Arish, which was 20 miles distant. Between his post and ours no water could be found. After the occupation of the town, horses were watered and immediate steps were taken to patrol the country to find out what had become of the garrison. The defence of El Arish was handed over to the Yeomanry and 52nd Division as they came up, and on the evening of the 21st the Anzac Mounted Division concentrated at a point five miles south of El Arish on the Wadi. Here supplies were issued, and the division resumed its march at midnight to Magdhaba, 30 miles to the south of El Arish. Each hour was divided into 40 minutes riding, 10 minutes leading and 10 minutes rest. Orders to attack were issued at 8 a.m. on the 22nd and fighting continued all day, after which the position was taken. Three regiments were then left to clear the battlefield, and the rest of the force began their 30 mile ride back to El Arish. Horses and men had now been marching and fighting for thirty hours without pause, and for most of them it meant the third night without sleep. The return journey was found to be one of the most trying of the many wearisome marches experienced by the force. Men in their sleep fell off their horses which stumbled and came down frequently from excessive fatigue. Dense clouds of dust almost blinded them, and they were continually colliding with one another in the dark. The force eventually arrived at El Arish on the morning of the 24th, when it was heavily bombed by enemy planes.

Our animal losses during this action were astonishingly small considering the fighting done, the scarcity of water and length of the marches. They were :—

Killed.		Wounded.		Missing.	
Horses.	Camels.	Horses.	Camels.	Horses.	Camels.
27	1	32	—	—	1

The season was now mid-winter, and although the days were hot, the nights were bitterly cold. On December 27th there was a bitter gale from the north-west, with much rain and hail, which lasted for twelve days. Horses and men huddled together into all the sheltered nooks that could be found. Excellent fresh water in limited quantities was found in the sand, and ship-loads of stores and forage were landed on the beach.

Attention has been drawn to the poor condition of the animals of many units during and immediately after the evacuation of Gallipoli. Most of the animals had long coats, and many were found to be suffering from lice, but after the units had received their reinforcements there was a general improvement. The supply of clipping machines was not equal to the demand, and authority was given to units to engage Egyptian clippers, who carried out this work expeditiously at a small charge for each horse. Several regiments, owing to the difficulty experienced in obtaining machines from the proper source, purchased mechanical and hand clippers at their own expense. Scales of issue had not been fixed for all units in Egypt, and the Director of Ordnance Stores, Levant Base, referred the question for consideration as a matter of general policy

before making issues. The following points were established as a result of this consideration :—

- (a) The opinions of responsible commanders concerning clipping differed so materially that it was by no means easy to fix a scale.
- (b) It was not always practicable to clip the animals of an army on active service even when it had been agreed that clipping was advisable.
- (c) When clipping was necessary it followed logically that all the animals should be clipped, as far as possible, simultaneously.
- (d) If clipping is to be adopted as a universal practice, ordnance depots, in order to ensure the equipment being ready when needed, should arrange to store the required number of machines as a permanent stock to be issued when necessary and returned after use. One power clipping machine with four spare heads and two hand clippers for every hundred horses was recommended as a general issue.

It was now too late to obtain a sufficient number of machines to carry out the clipping of animals on a universal scale during the current winter, but arrangements for the provision of clipping machines for the following winter were decided upon and the following scale was authorised :—

Power clipping machines for—

G.H.Q.	..	..	..	..	..	..	1
Regiment of Cavalry	..	..	..	..	..	..	4
Brigade of Artillery	..	..	..	..	..	..	6
Brigade of Infantry	..	..	..	..	..	..	2
Division (for use with units not specified above)	..	..	..	..	..	..	6

Although this early warning had been given, the Director of Ordnance was unable to get sufficient supplies from home to meet requirements. The blades of the power clippers soon became blunt and worn out in the field, and the efforts of commanding officers to get their animals clipped early were only partly realised.

In the early phases of operations in the canal zone, shelters made of matting and canvas had been erected to protect animals from the sun, but as the campaign progressed and transport became more difficult the shelters were left behind. In such a dry climate horses and mules, while healthy, were able to bear the full glare of the sun at all times with no ill effects. This was more evident at a later date under the appalling conditions of the Jordan valley, where they maintained their condition and general fitness in a wonderful way.

In December, 1915, the grain ration for horses and mules in Egypt was as follows :—

				<i>Barley.</i>	<i>Bran.</i>
				lb.	lb.
Horses 16 hands and upwards	..	..	..	11	1½
Horses under 16 hands	..	..	..	9	1¼
Mules 15 hands and upwards	..	..	..	9	1½
Mules under 15 hands	..	..	..	8	1¼
Native horses	..	..	..	8	1½

Compared with the European scale, and also with the Egyptian scale for animals in the open, the grain ration was considered small, and a scale based on the classification of animals by work was recommended and subsequently authorised. It was as follows :—

	<i>Barley.</i>	<i>Hay.</i>	<i>Salt.</i>	<i>Compressed Rations.</i>
	lb.	lb.	oz.	lb.
Heavy draught horses ..	15	15	1	30
Light draught horses	12	12	1	24
British cavalry horses				
Draught mules ..				
Arab and country horses	10	12	1	22
Pack horses ..				
Pack mules ..	8	10	$\frac{1}{2}$	18
Donkeys ..	4	8	$\frac{1}{2}$	12

The following equivalents were allowed according to the class of forage available :—

	lb.		lb.
Barley ..	1	Hay ..	$1\frac{3}{4}$
Gram ..	1	Dries ..	2
Crushed maize ..	$1\frac{1}{4}$	Tibben ..	$3\frac{1}{2}$
Oats ..	$\frac{3}{4}$	Bersim ..	10
Bran ..	$1\frac{1}{4}$	Linseed* ..	$\frac{3}{4}$

* Issued to veterinary hospitals and remount depots only.

The transport and feeding of bulky forage, particularly in desert warfare, present many difficulties, some of which may be overcome by the use of a suitably compressed ration. The local manufacture of this commodity lent itself to serious abuse, and the Director of Supplies and Transport decided to establish his own plant in Alexandria, but before making the ration on a large scale the veterinary service was requested to make observations on the sample proposed for issue. This sample consisted of :—

Tibben ..	40 per cent.
Crushed barley ..	35 "
Crushed maize ..	10 "
Bran ..	5 "
Sucrapaille* ..	10 "
Coarse salt ..	1 oz. per 20 lb.

*Sucrapaille is composed of wheat straw, thoroughly broken up, screened and mixed with molasses.

As it was found that transport and riding horses in veterinary hospitals when fed on this mixture did not lose condition whilst at work, it was decided to issue it to units in the field, and the ration was made into bales of definite weights, suitable for being carried on camels in the desert.

In spite of the care taken by the Army Service Corps in the manufacture of compressed forage, there were occasions when inferior material was used, and some of the bales issued to units in the desert became musty or heated during storage and transit, with the result that horses fed on these suffered from diarrhoea. There was also a loss of material in handling the fodder in the

field, but this was overcome by the issue of feeding sacks, and later in the year a large suitable canvas nosebag was adopted and issued to all units.

The ever-increasing demand for forage in Egypt, consequent on the development of the army, resulted in a scarcity of some of the commodities. Cotton had, on the advice of the home government, been grown by fellaheen in preference to barley and dries, and by August there was not sufficient barley to continue the issue to all animals. There were, however, large stocks of maize in the country, and it was decided to utilise this as part of the fixed ration for mules. The reduction in the feeding value of the ration, without any corresponding diminution in the amount of hard work which mounted troops were called upon to perform, was followed by a loss of condition, and this was intensified during the bitter cold nights of the winter months. An extra 2 lb. of grain daily was then recommended and authorised for the Desert Mounted Corps. This increase led to an improvement in the horses' condition, and the extra issue was continued up to the end of February, 1917.

On the lines of communication crude treacle and locust beans were issued, and all sweepings of tibben and compressed fodder factories were consumed to admit of the full scale being issued to units in the field.

Frequent inspections of forage by veterinary officers were carried out and resulted in the following defects being brought to notice :—

Adulteration of dries with inferior grasses by contractors.

„ dhoura with sand.

„ bran with sawdust.

The issue of forage of inferior quality was not of frequent occurrence and was readily exchanged by supply units, but the procedure to be adopted had to be pointed out repeatedly to some units by veterinary officers before it was recognised.

Reference has already been made to the brackishness and scarcity of the water. Prior to this campaign the principle had generally been accepted that horses could continue to work for a maximum period of about sixty hours with very little water, after which they would require some days of rest. During the advance across the Sinai desert experiments were carried out by the commanders of different units and by officers of the veterinary service with a view to ascertaining whether horses, under the conditions prevailing, would fare better with two drinks a day or three. Horses of the same type and as equal as possible in condition were selected, half being put on two waterings and half on three waterings daily. The results of these experiments were conclusively in favour of two waterings a day. Not only did the horses under this régime improve in condition more quickly than those which were watered three times daily, but it was proved by actual measurement that they drank more water in the day. By the time the force arrived at El Arish, watering twice a day was generally accepted as the standard.

The type of shoe used for home service and for the British Expeditionary Force in France was found to be too heavy and clumsy for animals working in the desert and lasted for two or even three removes. Sixty nails a set were supposed to be carried with the shoes, which sufficed for at least one remove, but when tests were made by opening boxes of shoes in the field the correct number of nails was not invariably found. This was pointed out, and a general routine order was published authorising the use of the necessary nails, leaving a number of surplus shoes without nails. The surplus shoes were then repacked in the boxes with the empty nail tins and returned to the Army Ordnance Department. Consignments of light, broad, webbed shoes similar to those used in India and South Africa were received occasionally and were found to be more suitable for the desert than the home type, but the issue was never general. Many of the horses working with the heavy batteries operating with the mobile columns in the desert had damaged feet caused through the attempt to shoe them cold; this was however remedied at a later period by the issue of field forges.

In the early days of the campaign in Egypt the standard of horsemastership was not high. There was a fair proportion of officers and men among the English troops who had had little previous experience of horses, and none at all under service conditions in the Near East. The Australian Light Horsemen were fine riders and thoroughly experienced with horses, and as soon as they realised the difference between active service conditions and those to which they were accustomed in their own country they became very good horsemasters. The New Zealand Mounted Rifles were, however, excellent horsemen and horsemasters and were mounted on exceptionally well-selected horses. The effect of this happy combination was noticeable in their low standard of wastage and sickness.

During the summer and autumn of 1916 there was a progressive improvement in the horsemanship of the force. The high level it reached at this period is fairly indicated by the small number of animals evacuated after the strenuous marching and fighting before and during the El Arish and Maghaba operations. The frequent inspection of units by administrative veterinary officers, and the attention paid to their advice by unit commanders, contributed in no small degree to this success.

The principal points brought to notice at these inspections were :—

1. The importance of early clipping in the autumn.
2. Defects in forage and the procedure for remedying them.
3. The necessity for supervision of watering.
4. Sanitary improvements in horse lines.
5. Shortage of head collars and grooming equipment.
6. Overwork in some units through being under-horsed.
7. Faulty shoes and shoeing; shortage of shoeing tools.

8. The prevention of collar galls.
9. The prevention of wastage in debility by :—
 - (a) Periodical rest and change of food and water after prolonged work in the desert.
 - (b) The systematic evacuation of all debility cases that did not improve after a week's rest.
 - (c) The necessity of extra forage for mounted troops doing strenuous work on the reduction of the nutritive value of the forage ration.
 - (d) The importance of night feeding.
 - (e) The prevention of waste in forage by the use of feeding sacks and nosebags.

Orders were published when necessary calling attention to the more serious faults in the above-mentioned respects, and at a later stage, to facilitate reference, these orders were embodied in a small brochure on horse management in Egypt, which was issued to all units in the field. A school of instruction for young officers was established in Cairo, which dealt with a variety of subjects, including horsemastership, on which an officer of the veterinary directorate gave lectures.

Inefficient horses and mules from the western front were transferred to the Base Veterinary Hospital at Alexandria, whilst those from the canal zone were transferred to No. 2 Veterinary Hospital, Bilbeis, which was used as a reception hospital and from which the animals were distributed in train loads to other veterinary hospitals in Egypt. All horse trucks arriving at Bilbeis were cleaned out and disinfected by veterinary sanitariesquads before being returned to Ismalia and Kantara. During the year the average weekly toll of sick horses and mules from the Sinai front was approximately 650, and these were transported in train loads of thirty trucks, each holding eight horses.

Disposal of Animals.

Animals which died or were destroyed in the zone of active operations were buried two miles from the nearest camp under unit arrangements. When this was impracticable, the carcasses were transported to suitable sites well away from troops, where they were disembowelled and left to disintegrate by natural causes, a process which was rendered possible by the dryness of the air and the high temperature. Animals which died or were destroyed in veterinary units at Kantara, Ismalia, Bilbeis, and Quesna were buried, but this procedure was found to be unsatisfactory owing to jackals and native dogs scratching up the earth and dragging out parts of the carcasses. Subsequently they were dealt with under the first-named system, and after four days' drying in the sun were stuffed with straw and burnt, while the skins were salvaged and sold to local contractors. Animals dying or destroyed in Cairo and

Alexandria were sold to the Cairo Manure Company and to the municipal authorities of Alexandria. This procedure was decided upon after conference with the Director of Public Health for Egypt, who pointed out that if carcasses were dealt with even in a proper sanitary manner anywhere except far out in the desert they would cause much inconvenience and unnecessary trouble, and that it was advisable therefore to employ the existing installations in the country.

Special precautions were taken in the case of deaths or destructions arising from contagious diseases at the front and at Bilbeis and Quesna, those at Cairo and Alexandria being dealt with by incinerator plants on the premises of the Cairo Manure Company and of the Alexandria Municipality.

Horses and mules unfit for further military service but suitable for work under civil conditions were sold by auction. Between January and May the remount service had sold 68 horses at an average price of £11 16s. 8d. each, and the veterinary service had sold 230 horses and mules at an average price of £11 1s. 6d. each. These animals were carefully selected by senior administrative officers, and as the average price realised for horses destroyed was £1 only, their sale was advisable on economical grounds.

In time of peace practically no horse breeding is undertaken in Egypt, which relies on the importation of horses and mules from Cyprus, Arabia and Turkey. Owing to the war these supplies had been cut off and, as transport camels were being largely purchased from the civilian inhabitants under impressment, it appeared reasonable also to sell to them animals which were of no further use for military purposes. Some of the British residents in Egypt were strongly averse to army horses being sold to Egyptians, basing their objection on grounds of cruelty and imperfect supervision by the civil authorities. Letters appeared in the local and home press in support of this view, and political pressure was brought to bear on the War Office, with the result that all sales were prohibited until the termination of the war, when army horses were sold by the thousand throughout the whole country.

When camps were first established in Alexandria the municipal authorities were unable to deal with the conservancy duties owing to their inability to purchase animals for draught work, and 163 army animals (118 mules and 45 horses) were loaned to them to overcome this transport difficulty. By the end of the summer of 1916 there was a considerable decrease in the number of troops, and the municipality was accordingly asked to consider a reduction in the number of animals on loan. On inspection the D.D.V.S. found 75 per cent. fit for army work, and he recommended that they should be replaced by cast horses from veterinary hospitals. This recommendation was approved, and when the animals became unfit for this duty they were destroyed and replaced by "casters," all of which worked well and kept good condition, thus demonstrating

the fact that under proper supervision Egyptians can take as good care of English horses as anybody else.

Sanitation.

In peace the disposal of manure in Egypt presented no difficulty as there was a good demand for it for agricultural purposes. The manure was removed from barracks under local contracts made periodically, but as the number of animals and camps increased and animal transport became more scarce it was impossible to deal with large quantities in this manner. At first large dumps were made a mile or more distant from barracks and camps, but as these dumps favoured the breeding of flies and were a great tax on horse transport other means of disposal had to be devised. At the request of the military sanitary authorities, the veterinary service carried out a series of experiments in veterinary hospitals with a view to solving the problem.

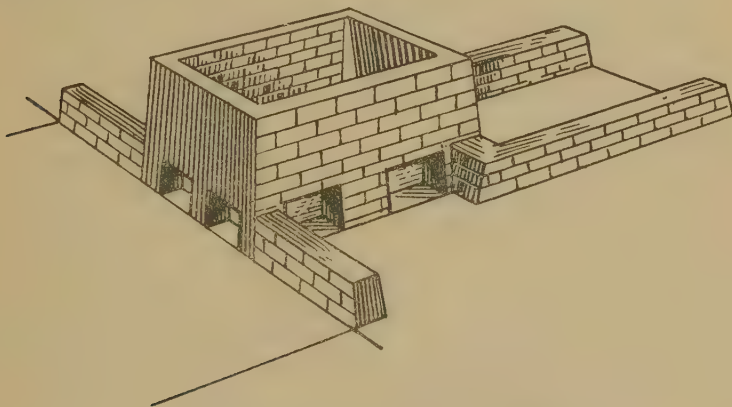


DIAGRAM OF SQUARE TYPE INCINERATOR.

A quantity of the manure of animals that had been bedded on straw at No. 20 Veterinary Hospital was burnt in a "square type" incinerator built with sun-dried bricks. The manure of 100 horses for a period of 24 hours was collected and allocated to one incinerator. This was spread out in a suitable thickness to facilitate turning and drying, and covered an area of 72 ft. by 27 ft.; after 24 hours' turning and drying it was fit for incineration. The actual burning took 22 hours, but a further hour was allowed to admit of complete and thorough destruction. The ashes raked out of the incinerator filled one native box cart, and amounted to one sixth, in bulk, of the manure incinerated. When no bedding was used, the manure from 100 horses for a period of 24 hours occupied an area of 42 ft. by 42 ft., and took 24 hours to dry and 24 hours for complete incineration.

Attention was then directed to the provision of drying platforms made of puddled mud and tibben beaten hard, with the surface

smoothed over and surrounded by a raised rim 6 in. high. These drying platforms were found to be satisfactory, and the disposal of manure by this method was afterwards adopted in all standing camps throughout Egypt.

The following instructions were issued to veterinary hospitals and convalescent horse depots to ensure the satisfactory working of incinerators :—

1. The manure should be well dried before being put into the incinerator.
2. It should be free from sand.
3. The fire in the incinerator should never be allowed to go out.

To secure the first condition, two platforms should be made near the incinerator, sufficiently large to dry the manure. These may be prepared by watering the sand and making it fairly hard, or by mixing sand with a small quantity of lime and water, and beating it down. The litter collected in the early morning should be spread out evenly on the first platform by the syces who bring it from the lines. The native in charge of the incinerator should turn this litter over two or three times during the day. By evening it will be sufficiently dry to burn, and should then be collected and put in the incinerator. The litter collected during the day should be placed on the second platform, turned over during the evening stable hour, and collected and dealt with in a similar manner in the early morning. If the litter at any time should not be sufficiently dry to burn, tiben or dry sweepings may be mixed with it.

To ensure freedom from sand the horse manure should be raked out from under the horses' feet, or hand-gathered as soon as possible after it has been dropped. When brushed out of the lines it gathers too much sand, which interferes with the burning.

It is of paramount importance that all manure should be burnt within 24 hours of being dropped.

An incinerator requires one native in charge during the day and one during the night. In the day time the natives should be placed under the supervision of a sanitary corporal, and during the night they should be supervised by the orderly N.C.O.

These N.C.Os. should see that :—

- (1) The syces spread out the manure when it is put on the platform.
- (2) The natives in charge of the incinerators turn over the manure on the platform.
- (3) The incinerators are properly fed.
- (4) The fires are stirred up frequently and holes made in the manure in the incinerators to make a good draught.
- (5) The ashes are frequently cleared out.
- (6) The holes on the leeward side of the incinerator are blocked up, to ensure a strong draught going through the fire.
- (7) Each incinerator is burning well at evening stables.

Disposal of Ashes. The ashes may be used for making roads in or about the hospitals or depots. They may be buried in pits near the hospital or carted away to a site selected in consultation with the sanitary officer.

Pending the construction of incinerators in camps the procedure for the disposal of manure was as follows :—

After the dumping areas had been allotted by the sanitary officer, sites were selected on open level ground not less than three-quarters of a mile from and to leeward of the camp. On the sites each day's manure was spread out in a uniform layer, 1 in. thick, to enable it to

be desiccated rapidly by the sun and wind. The method of working is shown in the subjoined diagram :—



The numbered and shaded squares represent the manure of four successive days, spread out as described above. The first day's output gave the size of the four areas required, and the remaining three areas (2, 3, 4) were marked out accordingly in advance and aligned on area 1, leaving an interspace or roadway 12 ft. wide between adjacent areas. Four days' output having thus been dealt with, the fifth day's manure was spread on area 1, the sixth day's on area 2, and so on. When the blocks of manure reached an inconvenient height fresh areas were brought into operation.

This procedure was adopted on the advice given by the army entomologist (Major E. E. Austin, R.A.M.C.) and was based on the fact that desiccation by exposure to the direct rays of the sun is rapidly fatal to flies' eggs, and also on the fact that flies are not attracted by manure which is dry, nor can fly maggots live in manure when it is in this condition.

Subsequently this knowledge was utilised in the building of "litter" roads in the vicinity of veterinary hospitals to ease the heavy strain on wheeled transport over the soft sand. No. 11 Veterinary Hospital at Quesna, No. 16 Veterinary Hospital at Heliopolis and No. 21 Veterinary Hospital at Bilbeis had excellent roads made in this manner. Exercising tracks were also made on these principles, and were found to be less injurious to the feet and joints of horses than sand. The ground in kraals was also covered with dried manure which prevented horses from eating sand and becoming affected with sand colic.

Each veterinary hospital had a sanitary detachment consisting of one N.C.O., three privates A.V.C. and thirteen Egyptian orderlies, who carried out the various duties in connection with manure, latrines, urine disposal, ablution water, kitchen water, cookhouse refuse, and camp rubbish. The officers commanding these units took a great pride in the cleanliness of both European and Egyptian camps, kitchens, shops, canteens, etc. On several occasions the veterinary hospitals won prizes open to all units in their respective areas for the state of their cookhouses and camps.

Transportation.

One officer, one N.C.O. and two to four privates A.V.C., varying with the number of transports arriving at the port, were detailed from the nearest veterinary hospital for embarkation duties. Port Said was not used extensively, and the veterinary staff was withdrawn as soon as it was no longer required. On account of the large

number of animals arriving at and leaving Alexandria, quarters for the veterinary embarkation staff were built; also sun shelters capable of holding twelve horses, which proved invaluable in protecting fever and pneumonia cases from the fierce rays of the sun, pending their removal to veterinary hospitals. Three horse ambulances were found necessary for this duty. Veterinary stores in varying quantities, to suit large or small consignments of animals, were made up at the base depot of veterinary stores and placed on board transports by the veterinary embarkation officer, who also collected the stores on horse transports arriving and handed them over to the base depot of veterinary stores.

Owing to the diversion of transports to other ports, veterinary surgeons engaged on horse conducting duties were held up for considerable periods at Alexandria, and as it was realised that these officers were urgently required in England steps were taken to ensure their priority of passage whenever possible and to obtain advances of money from their salaries to pay their hotel bills while detained in Egypt.

Fever, pneumonia, catarrh and injuries accounted for most of the casualties received from horse transports. On two occasions, however, contagious disease had been prevalent in the animals at the time of embarkation and had spread to an alarming extent during the voyage. The s.s. "Clan Mac-Corquodale," which left Australia in May, 1916, embarked several animals affected with strangles; and bad ventilation, arising from accidental causes, so lowered the vitality of the healthy animals and predisposed them to the disease that 93 out of the 440 shipped were lost on the voyage. The D.V.S. represented the inadvisability of shipping horses from Australia to Egypt in the months of May and June owing to monsoons and heavy seas.

Several horses arriving from Newport News, U.S.A., in September and October, 1916, were affected with ringworm, a fact which pointed to infected remount depots. At one period there were 237 animals from this source under treatment in No. 26 Veterinary Hospital, Alexandria.

The method in force at base ports for the disinfection of ships was as follows:—

When the animals were disembarked, a gang of 50 to 100 natives was sent on board to clean the ship by removing all manure, lifting up the grating boards and scraping all parts of the fittings soiled during the voyage. After this all the stalls were washed with the ship's hose, fillings and floors being treated with a strong solution of cresol. When this cleaning had been completed the stalls and gratings were whitewashed with lime and cresol, and the mangers were scrubbed out and washed with disinfectant. It was not possible to wash out the decks below the water line of some ships, and in these instances, after removal of the manure, the floors were mopped and then disinfected. The embarkation veterinary officer, whenever possible, supervised these duties.

Veterinary Stores.

In the early part of the year the following base advance veterinary store depots were established :—

- (a) The Levant Base Depot of Veterinary Stores, Alexandria, for the supply of all stores to base and advance store depots in the Near East.
- (b) The Base Depot of Veterinary Stores, Salonika, for the Salonika army.
- (c) The Advance Base Depot of Veterinary Stores for the use of units in, and east of, Cairo.

The concentration of troops in the canal zone and prospective operations in the Sinai desert necessitated the formation of an advanced base depot in a central position in this area, and one was formed and located at Ismalia in March, after which the following instructions for issue were circulated :—

- (1) From now onwards the arrangements for the supply of veterinary stores will be as under :—

From the Advance Veterinary Stores, Ismalia—

Mediterranean Expeditionary Force units in the canal zone and units at Suez and Port Said.

From the Advance Veterinary Stores, Abbassia—

Force in Egypt units, except those of the Western Force and in Alexandria.

From the Levant Base Depot of Veterinary Stores, Alexandria—

Salonika Force, Advanced Veterinary Stores (Cairo and Ismalia), Veterinary Hospital and Convalescent Horse Depots, units of the Western Force, and those in Alexandria.

- (2) The stores to be issued to veterinary officers and units are normally those which are contained in the officers' chest and wallet, the unit chest, and the farriers' wallet.

The supervision of issue was delegated to the A.D.V.S., Alexandria, the D.D.V.S., Egyptian Expeditionary Force, and the D.D.V.S., Mediterranean Expeditionary Force and Salonika. On the reorganization of the force into the Egyptian Expeditionary Force the above arrangements was modified as follows :—

Levant Base Depot of Stores D.D.V.S., E.E.F.

Advanced Base Depot, Abbassia O.C. No. 20 Veterinary Hospital.

Advanced Base Depot, Ismalia A.D.V.S., G.H.Q.

These officers were instructed to exercise economical control over the issue of additional drugs and stores not considered necessary for use with units and to refer exceptional demands to the D.V.S. at general headquarters.

With the exception of an advanced depot of veterinary stores formed in Salonika in September, no other depots were formed in 1916.

Owing to the increased work in the Levant base depot of stores consequent on its becoming the central distributing depot for all forces in the East—the average weekly issue being seven tons, most of which was mange dressing—the personnel allowed by war establishments was found to be insufficient, and four extra men were attached for periods of six weeks for training, after which they were relieved by others. This arrangement provided a reserve from which suitable men could be selected for duty with advanced store depots formed at later periods. Extra labour was found necessary for the mixing and handling of mange dressing, and authority was obtained for the employment of five Egyptian labourers for this purpose, at $4\frac{1}{2}$ piastres a day, at Cairo and Alexandria.

To relieve the strain on shipping, an organization called the Local Resources Board was formed in Egypt for the purchase of various commodities required by the army. The large and urgent demand for mange dressing and the delay in obtaining the ingredients from home called for prompt action. The D.V.S. arranged for the purchase of 20 tons of sulphur, 5 tons of washing soda, and 6 tons of ghee (native butter), all of which could be purchased at a lower price than in the United Kingdom. Supplies of cotton-seed oil, sesame oil, methylated spirits and vinegar were asked for and bought when required. The Director of Supply and Transport also placed at the disposal of the veterinary service large quantities of whale oil, rape oil, methylated spirit, lard, vinegar and soda, which were surplus to his requirements, and these supplies were all utilised in due course. Gum acacia and camphor for use with the Salonika force, bandages and wool were also purchased through the Local Resources Board, and the Director of Ordnance arranged for the local manufacture of farriers' wallets and scissors to replace those lost by divisions at Gallipoli before they left for France. It took approximately three months to obtain stores from the United Kingdom, and if the ingredients for mange dressing had not been available locally the mortality and inefficiency among camels would have considerably hampered military operations.

At first arrangements were made for a monthly supply of the more common stores in use to be sent out from the United Kingdom, supplementary indents being submitted for others, but owing to the many changes in the strength and organization of the force this system was found to be unsatisfactory and was replaced by monthly requisitions. Intradermal, palpebral, mallein and special syringes for use, which were not obtainable in the United Kingdom, were supplied from France by arrangement with the D.V.S., British Expeditionary Force. The veterinary equipment of the Australian and New Zealand A.V.C., also that of the Indian Camel Corps, differed considerably from that in use with British troops of the Egyptian Expeditionary Force. It was considered advisable for all

units to be provided with the regulation pattern in use, and all articles not conforming to this type were returned to their respective countries.

Veterinary officers with formations had no means at their disposal for making microscopic examinations, and all such material was sent to the Pathological Laboratory of the Ministry of Agriculture to be examined by Major F. E. Mason. The disadvantages of this arrangement, especially on active service, were obvious, and seventeen microscopes were cabled for from home but six only could be supplied. These were issued to the administrative veterinary officers of formations, who were instructed to examine material on the spot and to restrict the amount sent to Cairo.

Only one unit veterinary chest for each infantry brigade was authorised in mobilisation store tables, but owing to their wide distribution and the lack of communication one chest for each infantry regiment was found to be necessary. This scale was duly approved and adopted throughout the campaign.

A grain crusher with an engine, a horse ambulance and 1,000 light sheets as protection against flies for animals under treatment in veterinary hospitals were received from the Royal Society of Prevention of Cruelty to Animals in the early part of the year and were much appreciated by the veterinary service.

Veterinary Statistics, 1916.

The total wastage of horses and mules from all causes was 12,770, representing 12·15 per cent. of the average total strength of 105,121; 125,676 cases were treated by the veterinary service, and 50,872 of these were received into hospital. The numbers returned to duty represent 91·66 per cent. of the total, while 81 per cent. of those sent to veterinary hospitals, which naturally included all the very serious cases, were successfully treated.

The weekly wastage for replacement in the field and lines of communication units (died, destroyed, killed, missing and transferred to veterinary hospitals) was :—

<i>Average for the year.</i>	<i>Highest.</i>	<i>Lowest.</i>
2 per cent.	4·34 per cent. in August.	1·08 per cent. in April.

The weekly wastage (died, destroyed, killed, missing, cast and sold) of the force was :—

<i>Average for the year.</i>	<i>Highest.</i>	<i>Lowest.</i>
0·26 per cent.	1·25 per cent. in August.	0·13 per cent. in April.

(0·14 per cent. in field
units. 0·12 per cent.
in veterinary hospitals
and C.H.Ds.)

The numbers under treatment in veterinary hospitals and convalescent horse depots :—

<i>Weekly average for the year.</i>	<i>Highest.</i>	<i>Lowest.</i>
12·50 per cent.	14·90 per cent. in November.	9·37 per cent. in May.

The number of sick horses and mules during this period was exceptionally high, due to the fact that the inefficient animals of all divisions, proceeding to other theatres of war, were weeded out before their departure.

The causes of admissions for treatment in hospitals and in the field were as follows :—

<i>Horses and Mules.</i>	<i>Percentage of total admissions.</i>		<i>Remarks.</i>
	<i>Hospital. per cent.</i>	<i>In the Field. per cent.</i>	
1. General diseases	36	13	Mostly debility.
2. Respiratory diseases ..	14	9	—
3. Diseases of Digestive Organs	1	23	Sand colic.
4. Skin diseases	5	2	Mange, ringworm and lice.
5. Locomotory	12	5	Lameness.
6. Specific	5	2	Glanders, strangles influenza, pustular stomatitis, piroplasmosis.
7. Injuries	25	45	Includes bullet and shell wounds.
8. Miscellaneous	2	1	—

The total wastage of camels was 6,498, of which 3,759 died or were killed in action, and 2,739 were cast and sold. The Veterinary Service treated 86,499 cases, of which 22,979 were sent to hospital. The numbers returned to duty represent 89·47 per cent. of the total and 72 per cent. of those sent to hospital.

The causes of admissions for treatment were :—

	<i>per cent.</i>		
1. General diseases	12		
2. Respiratory diseases ..	2		
3. Digestive diseases	3		
4. Skin diseases	50		Mange.
5. Specific diseases	3		Trypanosomiasis, Camel pox, lahtia.
6. Injuries	28		
7. Miscellaneous	2		

The weekly wastage for replacement in the field and lines of communication units (died, destroyed, killed, missing, cast and transferred to camel hospitals) was :—

<i>Average for the year.</i>	<i>Highest.</i>	<i>Lowest.</i>
2·73 per cent.	4·54 per cent.	0·73 per cent.

The weekly wastage (died, destroyed, killed, missing, cast and sold) of the Force was :—

<i>Average for the year.</i>	<i>Highest.</i>	<i>Lowest.</i>
0·44 per cent.	1·19 per cent. in April.	0·14 per cent. in September.

The number under treatment in camel hospitals was :—

*Weekly average
for the year.*

9·19 per cent.

Highest.

12·65 per cent.

Lowest.

6·25 per cent.

Debility, exhaustion, wounds and injuries accounted for the bulk of the cases from the front; while catarrh, pneumonia, strangles and ringworm provided the majority of cases received from remount ships.

Trypanosomiasis, a form of which was known to be prevalent in Egypt, was reported to be not easily communicable to horses, but, as a measure of precaution, instructions as to its causation and methods of preventing infection were widely circulated. The policy of isolation was followed as far as possible with regard to zones of infection, while animals known to be infected were destroyed whenever their presence constituted a possible danger. (See special notes on this disease.)

Mange was very prevalent among the camels but was kept well under control.

Glanders.—The mallein inoculation of all animals admitted to veterinary hospitals was established without delay, while every animal which left the country with formations proceeding overseas was also tested previous to embarkation. In the summer the detection of cases from various sources pointed to the necessity of a general test, and every horse and mule in the Force was consequently malleined, the inoculations being arranged on systematic lines which interfered as little as possible with the work of units. Those engaged in active operations were submitted to the test as opportunity occurred, and in the net result 194 cases were detected and destroyed. In order that no possibility of error might occur, some cases were further verified by bacteriological and pathological tests, and the nature of the disease was thoroughly established.

Sand Colic.—This was very prevalent in field units throughout the year, and although the percentage of mortality was not exceptional in horses, it was extremely high among Indian camels which had not previously been accustomed to sandy localities.

Influenza.—A very severe and general outbreak of influenza—traced to a consignment of horses from Australia—occurred at the Remount Depot, Bilbeis. Of the 3,900 animals in the depot, 3,221 contracted the disease, 561 being very severe cases necessitating treatment in No. 21 Veterinary Hospital. The entire locality was isolated, and the disease did not spread beyond it.

EGYPTIAN EXPEDITIONARY FORCE.

January to June, 1917.

After the successful operations at El Arish and Magdhaba, the force rested and refitted and prepared for an advance into Palestine, Rafa being the objective. Prior to the advance, the 1st Light Horse Brigade made a reconnaissance as far as the village of Sheik Zowaiid and reported great rolling plains of grass-land and green

crops just coming up through the ground, much to the delight of the horse lovers of the force.

On the evening of January 8th, the Anzac Mounted Division, accompanied by the Camel Brigade (with the Hong Kong and Singapore Battery) and the 5th Mounted Brigade, with a battery of the Honourable Artillery Company, marched out from El Arish. The first part of the way lay over heavy sand dunes; double teams had to be used for guns and ammunition wagons. Some miles farther on, when the old well-defined road was reached, the guns and ammunition wagons were given the hardened centre and horsemen rode on either side. Sheik Zowaiid was reached at 10 p.m.; a halt was made and the men tried to snatch a few hours' sleep on the ground with the horses' reins over their arms. But the horses, instead of standing still, as they had done hitherto in the desert, put down their heads and began to graze. When it was found that a halt had been made on cultivated land with a crop about six inches high, most of the men gave up all thought of sleep and helped their horses to the first green feed they had come across in the war.

At 1 a.m. on January 9th the column continued its march and came in contact with the enemy at dawn, just over the boundary line between Asia and Africa. The battle took the same course as that of Magdhaba, viz.:—a long night approach, contact at daybreak, closing in during the morning, a determined attack and surrender of the enemy at dusk.

During the 24 hours our horses and camels marched approximately 65 miles, while the advance guard traversed 87 miles. Horses were saddled up for 20 hours, and those of the advanced troops for 27 hours; on the average they were both without water for 34 hours.

Our battle casualties in animals were:—

		Killed.	Wounded.	Missing.	Total.
Horses and mules	..	46	144	10	200
Camels I.C.C.	.. ..	9	2	6	17

There were 130 camels, mostly in the Hong Kong and Singapore Battery, suffering from sore backs, due to the greater loads they carried and the long time they had been saddled up. The change of water, however, and the grazing facilities enabled all the animals to recover quickly from their exertions, and when, between January 15th and 17th, they were inspected by the D.V.S., he reported all horses, mules and camels as being in good condition.

The capture of Rafa, in which mounted troops had played the most active part, completed the conquest of the Sinai desert. The small force of Australian and New Zealand horsemen, British yeomanry and territorial gunners, which entered the campaign at Romani, now formed the nucleus of a large and highly efficient body of mounted troops.

The rainy season was now well established and the troops settled down into fairly comfortable bivouacs and tents brought up by rail, the construction of which was much delayed by floods and storms and by the necessity for building bridges.

The crossing of the waterless and barren desert, 150 miles in width, and the various operations at Katia, Romani, El Arish, Magdhaba and Rafa had been brilliantly achieved, and it may be said that no desert campaign had ever been conducted with more expert foresight and skill, or with fewer casualties, other than those occurring in action. The abnormal conditions involved in some cases a complete reorganization of units to suit local conditions, and the force was more than usually dependent on horses, mules and camels for fighting and transport duties. This was fully realized by the Commander-in-Chief, who stated in his final despatch that the veterinary service held a vital place in the organization of the force and had carried out its duties to his complete satisfaction. The engineering feats were also remarkable. The troops which fought at Gaza used drinking water which had been brought from Egypt, and a fine railway had been made once and for all across the desert, thus preparing the way for more brilliant successes as soon as a force of sufficient strength could be collected and trained for an offensive on a much larger scale.

During January and February, the usual patrols and reconnaissances were made and extended up to Wadi Ghuzzi, a few miles from Gaza. The country, with the exception of a sand dune belt one-half to two miles broad near the sea, consisted of open and rolling downs, with no fences and very few trees. It was either pasture or arable land with growing crops; thousands of acres had been cultivated by the Bedouin inhabitants.

Instructions were issued to troops to utilize the green crops in feeding animals; but when recourse was had to grazing, the extra two pounds of grain daily, which had been authorised for the mounted troops, was withheld. A routine order was published against feeding on newly threshed barley, especially while severe work was in progress. If at any time its use was unavoidable, officers were advised to mix it with old barley in the proportions of one to three, but if it had been stored one month there was little danger in using it.

The value of the grazing, the generous feeding, and the good water, at this stage was incalculable. *Sand is eliminated from the intestines in enormous quantities when animals are fed on unlimited green food*, and most of the horses and mules by this time were full of sand. By the end of March the condition and health of all animals of the force was better than it had been in any period of the war and they were thus able, later on, during the Gaza operations, to undertake long and continuous marches on reduced forage rations and with practically no water.

There are numerous small villages between Rafa and Gaza, each having one or more wells, while some have stone cisterns which are

filled by rain or by mechanical means from the wells. The largest and deepest well was found at Khan Younis, and, after the Royal Engineers had installed an engine, it gave an unlimited supply of water to both men and horses. Headquarters of formations allotted wells according to their estimated yield and according to the number of animals in each unit.

The improvement of the situation in Egypt enabled the Imperial Mounted Division, consisting of the 3rd and 4th Australian Light Horse Brigades and 5th and 6th Mounted Brigades, to be formed in February, when it joined the rest of the force at Rafa, Major Murray-Jones, A.A.V.C., being appointed A.D.V.S. A reorganization of the lines of communication took place in February when a Southern Canal Section was formed, Captain (temporary Major) H. E. Powell, A.V.C. (T.F.), being appointed A.D.V.S. In March a Northern Section, to which Captain (temporary Major) A. C. Duncan was appointed A.D.V.S., was formed. At this period also the Western Frontier Force and the Delta District were amalgamated, Major G. E. Tillyard, A.V.C., being appointed A.D.V.S.

By the middle of March the railway had reached Rafa. The weather had cleared up and preparations were made for a further advance into Palestine. An attack on Beersheba entailed a wide turning movement, through a roadless and waterless tract of country, for which preparations could not be made for a considerable time. Further, the force had been weakened unexpectedly in March by the departure of the 42nd Division, T.F., to France, and there was not sufficient time to form and train a new division from the remainder of the dismounted yeomanry which was surplus to the requirements of the Imperial Mounted Division.

The Commander-in-Chief therefore decided to attack Gaza, where the lines of communication could be more easily protected, where there was a better water supply, and where the nature of the country permitted of a more rapid construction of the railway.

The strength of the Turkish force at Gaza and Tel el Sheria was estimated at 7,000 rifles supported by heavy field and machine guns, with reserves at no great distance from both places. Hitherto, most of the fighting had consisted of long distance raids carried out by mounted troops, but for this undertaking all arms—infantry, cavalry, artillery and camelry in full strength—were required, while the administrative problems were correspondingly more difficult. The railhead was 20 miles distant from Gaza, and there was considerable difficulty in concentrating the force and supplying it with water. The Camel Transport Corps was now too small for the augmented force and had to be supplemented by first line wheeled transport brought up from Kantara, with the object of enabling mounted troops to operate within a 30-mile radius and infantry with a 20-mile radius. Even with this increase it was only possible to provide one day's supply of water for all, so that unless water was found in the Wadi Ghuzzi, or elsewhere, operations would have to be broken off after one day.

On the night of March 25th and 26th the desert column, consisting of the Anzac Mounted Division, the Imperial Mounted Division and the Imperial Camel Corps, moved rapidly forward and intercepted the roads leading to Gaza from the north, east and south-east, thereby preventing the escape of the garrison and cutting off any relief. The 53rd Division followed and attacked Ali Muntar heights, south of Gaza, with the 54th Division in support, whilst the 52nd Division protected the lines of communication back to Rafa. The mounted troops carried out their part of the programme to perfection, penetrating Gaza from the north and capturing many prisoners, two Austrian Krupp guns, a convoy of 6 wagons loaded with stores, 6 camels, 16 horses and 12 mules. The guns were brought back to Dier el Belah by Major Stafford, the Brigade Veterinary Officer of the New Zealand Mounted Brigade. Unfortunately, a thick fog rolled inland as day broke and greatly interfered with the movements of the infantry, who had to grope their way in the dark over unknown ground and were consequently two hours late in commencing their attack. The enemy's position was a strong one and the line of advance was devoid of all cover, but by 5 p.m. the infantry had captured Ali Muntar ridge and had surrounded Gaza. Owing to numerous gardens that extended north, west and south for three or four miles, and were encircled by huge cactus hedges, further progress in the dark was extremely difficult. Consequently, as strong Turkish reinforcements were reported to be on their way from Tel el Sheria, the attack was broken off and the troops were withdrawn, re-crossing the Wadi Ghuzzi on the night of 27th/28th. There was a khamsin blowing throughout the day and the thermometer registered 90° in the shade. The distance covered by our mounted troops, including the retirement, was approximately 50 miles, and some units marched 65 miles in 24 hours. The net result of these operations was an advance of the front line to the Wadi Ghuzzi, which provided water for animals in the front line.

Our animal casualties were as follows :—

	Killed and Destroyed.	Missing.	Wounded.	Evacuated to Veterinary Hospitals.	Total.
Horses and mules	130	85	85	125	425
Camels	100	—	—	40	140

On April 17th a second attack was made, in which the 52nd, 53rd, and 54th Divisions and the Imperial Camel Corps took part, whilst the 74th Division, which had been hastily formed from eighteen dismounted yeomanry regiments and was still incomplete, was held in reserve, the Desert Mounted Corps making demonstrations and protecting the right flank. Tanks were used in this attack, but the country was unsuitable for them and they were all soon knocked

out of action by the Turkish artillery. On the second day the infantry was reinforced by the Imperial Mounted Divisions, and on the third day all troops were actively engaged. Our objective was not attained, and as the ground gained was not of sufficient tactical importance to promise any decisive advantage it was decided to suspend the attack, to consolidate positions, and to devote all resources and energies to the preparation of a more systematic and better supported effort in the autumn.

The animal casualties during the three days' fighting and defensive operations up to April 26th were as follows:—

	Killed.	Died.	Destroyed.	Missing.	Wounded.	Evacuated to hospital.	Total.
Horses and mules	317	10	30	80	510	284	1,231
Camels	285	123	9	—	195	286	898

Most of the casualties were due to shell fire and bombs. Several missing horses, mules, and camels, were included in the killed as it was impossible to obtain exact details during the heavy fighting.

There was a khamsin blowing from about April 24th to 26th, from which 335 camels, in addition to the above, died of heat apoplexy, but there were no deaths from this cause among the horses and mules.

Before the commencement of operations the D.D.V.S. held a conference with all administrative officers of formations and arranged for:—

- (1) The prompt submission of states by telegraph of battle casualties.
- (2) The establishment of dressing and collecting stations during the battle.
- (3) The location of mobile veterinary sections in central positions so as to place them within reasonable reach of all units of their formation.
- (4) The most suitable routes for transfer of sick animals to No. 1 Field Veterinary Detachment at Rafa.
- (5) The procedure to be adopted in dealing with captured animals.
- (6) The necessary shoeing of all animals owing to the change of terrain.
- (7) The advice to be given to units on the care of remounts pending their recovery from coughs and colds, which were contracted en route from Kantara.
- (8) Supervising the periodical cleansing of watering troughs, and seeing that satisfactory watering arrangements were made for small units which were occasionally overlooked.

The period from the end of the Gaza operations until the big offensive in October, 1917, was one of trench warfare for infantry, while the mounted troops took over the right flank and extended their position to Tel el Fara, after which they were occupied in minor enterprises. These took the form of drives by day and night, surprises of certain localities by forces up to one brigade, traps for enemy patrols, and raids on the Turkish railway.

The constant movement of troops over the light sandy soil converted all roads and tracts into dust beds several inches deep. This increased the strain on wheeled transport, which raised large dust clouds and precluded the movement of troops during the day.

Towards the end of June another division (the 75th) was made up of units (Territorial and Indian) recently arrived from India, Captain (temporary Major) H. E. Powell, A.V.C. (T.F.), being appointed A.D.V.S. About the same time the mounted troops were reorganized into three divisions and became the Desert Mounted Corps, the composition being as under :—

Anzac Mounted Division.

1st A.L.H. Brigade.
2nd A.L.H. „
N.Z. Mounted Rifles.
3 Batteries R.H.A.

Australian Mounted Division.

3rd A.L.H. Brigade.
4th A.L.H. „
5th Mounted „
3 Batteries R.H.A.

Yeomanry Mounted Division.

6th Mounted Brigade.
8th „ „ (from Salonika May 8th).
22nd „ „
3 Batteries R.H.A.

Corps troops :—7th Mounted Brigade.

Captain (temporary Major) F. W. C. Drinkwater, A.V.C. (T.F.), was appointed A.D.V.S. of the Yeomanry Mounted Division.

The mobile veterinary sections for the 74th and 75th Divisions were formed from A.V.C. personnel serving in the Egyptian Expeditionary Force, but the executive officers A.V.C. for these divisions had to be sent out from home.

The extent of the lines of communication patrolled by the Northern Canal Section having increased considerably in length, this section was reorganized to form the Palestine lines of communication defences, and Major T. E. Tillyard, A.V.C., was transferred from the Delta and West Force command, Captain (temporary Major) A. C. Duncan, A.V.C. (T.F.), being appointed A.D.V.S. to the latter command. A short time afterwards this officer was transferred to the 54th Division in relief of Major Tennant, whose health had partly broken down and who eventually became A.D.V.S., Delta and West Force. Major H. Mason was transferred to the I.C.C. Brigade and remained with this unit until April 20th, when he and three Egyptian veterinary officers were recalled by the Ministry of Agriculture, Egypt, to deal with a serious outbreak of cattle plague. Major Mason, from the date of his appointment (December 3rd, 1914), had rendered to the army services of the greatest value, for which

he was mentioned in despatches and awarded an O.B.E. His return to the Egyptian Government at this period was a great loss to the veterinary corps.

Demands for N.C.Os., A.V.C., for appointments not included in home war establishments, were frequently received. One was sent to Somaliland as the senior N.C.O. to the camel remount depot at Birbera; two were sent to Algeria on similar duty; one was sent to Cyprus to assist in the care of donkeys purchased; and two were detailed for duty on remount transports for India. Men of the same category had also to be provided for divisional trains, as the supervision of shoeing and carriage smith work took up all the time of the senior farrier N.C.Os. of the Army Service Corps.

There were no veterinary subordinates with the Indian infantry brigades which arrived from India during this period, and difficulty was experienced in carrying out veterinary duties efficiently in these formations. This was represented to the general staff, who authorised the appointment of N.C.Os., A.V.C., to Indian brigades as a local measure, thus bringing them into line with British units in the field.

The Indian brigades also arrived with no shoeing personnel, and as India was unable to comply with a request for trained nalbands, the difficulty was overcome by posting British shoeing-smiths to them from the base depots until a sufficient number of Indians had been trained in veterinary hospitals.

Class "B" men from home were now being received as reinforcements and were distributed amongst veterinary units on the lines of communication, class "A" men being held in readiness for vacancies in mobile veterinary sections. The pressing need for class "A" men for fighting units led to an inspection of all administrative units in Egypt by Lieut.-General Sir H. M. Lawson, who was sent out from the United Kingdom to go into this question. In his report on the veterinary services he stated that he was much struck by its general organization and by the excellent results already obtained. He pressed for the replacement of "A" men below the rank of serjeant in veterinary hospitals and convalescent horse depots by Egyptian cavalry men or by "B" men selected from garrison battalions. He also recommended the reduction of mobile veterinary sections allotted to infantry divisions and their reorganization into corps units, in which class "B" European personnel were to replace class "A" below the rank of serjeant, and the other ranks were to be diluted with Egyptian personnel.

The efficiency of the veterinary services had already been considerably affected by the poor class of reinforcements received from home, and great difficulty had been experienced in finding men of the right class for appointments in the field. Consequently, in discussing the above proposals, the D.V.S. pointed out that:—

- (1) The reduction already made in numbers employed on the lines of communication as compared with European establishments was 75 per cent. of the total.

- (2) If Egyptian soldiers were made available, further reductions could be effected, but without raising and training a native corps not much more could be done without loss of efficiency.
- (3) For work with mobile sections and with artillery and camel units men were required who were physically fit for the duty, and that men of class "B" were not fit for this kind of work.
- (4) Mobile veterinary sections at the beginning of the war were smaller than at present and had had to be strengthened. The corps organization of these units was not recommended, as the division was the basic formation of the army and should be complete in itself.
- (5) The number of class "A" men with mobile veterinary sections of the Egyptian Expeditionary Force was about 200, and if this number was reduced some of their duties would ultimately have to be undertaken by fighting men detached from units, to prevent which the mobile veterinary section had been created. The dilution of its personnel with Egyptians was not advocated.

A lack of appreciation of the usefulness of mobile veterinary sections during quiescent periods led to a proposal for their reduction, which was discussed with the general staff of the East Force. It was pointed out that these sections were just able to deal with the evacuation of the sick during and after operations within a twenty to thirty miles radius, and that in the event of a long and rapid advance supplementary means would be required to assist them in these duties, failing which animal wastage might be serious. After hearing this explanation the G.O.C. agreed that there should be no interference with their number or strength.

As there was no prospect of an early advance, and our positions were considered secure against an attack from the enemy, cavalry brigade and infantry divisional mobile veterinary sections were now grouped, as a temporary measure, into three areas located in the vicinity of Rafa, where there were better feeding and watering facilities. Inexpensive kraals with canvas shelters were erected, enabling the sections to function as small hospitals as well as to help in the evacuation of serious cases to hospital. This policy considerably relieved the strain on the railway, and made it possible for more horses to be returned direct to their respective formations. Commanding officers preferred the less serious cases thus returned to duty to unseasoned remounts. The latter in many cases developed catarrh during the long journey from Egypt, and were thus rendered useless for six weeks after their arrival. This point was well illustrated when the Yeomanry Mounted Division received a consignment of 918 remounts in April, and a further one of 614 in May, with the result that animal inefficiency and wastage in this division were higher than in any other, and were mostly attributable to loss of condition and protracted recovery from catarrh.

There was no organization in the Imperial Camel Brigade corresponding to the depot section in the Camel Transport Corps for resting and dressing camels periodically and evacuating serious cases. This state of things was duly represented in February, and provisional sanction, pending War Office approval, was given for the formation of a camel mobile veterinary section with a mixed establishment of European and Egyptian personnel, and a mobilization store table was drawn up. *See* Table D (page 347).

Arrangements were made for three open trucks for sick camels of the I.C.C. and C.T.C. to be run daily between Dier el Belah and El Arish, where they were taken over by No. 3 Camel Hospital. The sides of the trucks, though suitable for horses, were too low for camels, and occasionally they were jolted over the sides. The trucks were then provided with wooden railings, after which there were no more accidents. The ramps used for horses were also found to be too steep for camels and had to be lengthened.

Difficulties arose over certain points in connection with the recruitment, pay, clothing and accommodation of Egyptian personnel employed with the army, and all services were requested by the D.Q.M.G. to furnish particulars with a view to their co-ordination. Those for the veterinary service are given in Table E (page 348). Subsequently the issue of clothing and equipment for Egyptian personnel on enlistment and before discharge was controlled at No. 16 Veterinary Hospital and the Camel Veterinary Hospital at Kantara. It was also decided to encourage the enlistment of certain classes by giving a bonus of 50 piastres to those who re-engaged within twenty days after the date of their discharge for a further period of six months. To enable this to be carried out satisfactorily by the Inspector of Recruiting a combined discharge and bonus certificate was issued to each Egyptian on discharge. Units requiring personnel received an allotment of identification numbers and forwarded identity discs marked accordingly to the D.V.S. for transmission to recruiting officers.

In addition to the authorized scale of clothing issued to Egyptian personnel in the field, men employed on dressing mangy camels were provided with old part-worn clothing, and men employed on night duty were issued with part-worn great coats to the extent of $12\frac{1}{2}$ per cent. of the establishment.

No. 2 Camel Hospital, which acted as the depot for Egyptian reinforcements, was frequently congested with sick animals. Consequently a floating reserve of 60 camel syces was held on the strength to ensure all duties being carried out efficiently and to allow of personnel being supplied at short notice to the Camel Mobile Veterinary Section and to No. 3 Camel Hospital.

The increase in the size of the force east of the Suez Canal made it necessary to utilise Kantara as the main base for operations. On this account a remount depot and veterinary hospital were built at Kantara in the spring, and No. 16 Veterinary Hospital was transferred from Cairo on June 8th. A supply depot in close proximity to both units and railway sidings with platforms for unloading

horses from the main railway line (Ismalia to Kantara) were erected. Trains frequently arrived from the front too late for sick animals to be marched over the pontoon bridge of the Suez Canal. This necessitated their detention overnight at Kantara East, and a detachment of the hospital had to be located there permanently to receive and take care of them until the bridge was open for traffic.

Forage.—The extra 2 lb. of grain for animals of mounted units authorized in 1916 was issued in full until March, when it ceased to be drawn for animals being grazed. In May this extra allowance was cancelled altogether. It was thought at this time that there should be sufficient grazing in Palestine to compensate for the reduction; there was also need for strict economy in forage issues, because of the scarcity of feeding-stuffs in Egypt and of the prospective increase in the strength of the force by 10,000 animals. A full ration of barley had been maintained until May, when stocks became low, necessitating the use of a grain mixture consisting of 45 per cent. barley, 35 per cent. grain and 20 per cent. millet for horses and mules and 60 per cent. millet and 40 per cent. grain for camels.

On January 1st the issue of dries was reduced by 50 per cent. to horses and was cancelled altogether as an issue to mules. About the same time Indian hay had to be utilized as part of the bulk ration. The grasses of which this hay was composed would have been nutritious if they had been cut in the proper season, but it was evident that they had been harvested at a late period of growth, and were nothing more than woody stalks. On the average, not more than half the total amount was consumable (even that had very little feeding value in it), and a very large proportion was uneaten even by hungry horses. The Indian field service forage ration of dry grass was 20 lb. a horse, whereas the Egyptian Expeditionary Force hay ration was 10 to 12 lb., the nutritive value of which had been much reduced by the substitution of 50 per cent. of tibben for dries. Two pounds of Indian hay were issued at the same rate as tibben, which, although poor, was of better feeding value. As no other fodder was available, this Indian hay had to be issued, but it gave rise to numerous complaints and caused a deterioration in the condition of many animals. It was thought that after outstanding shipments of forage had been delivered, Egypt would be self-supporting for a considerable time, and no representation was therefore made to the War Office or India. In the meantime, all kinds of expedients were tried to induce the horses to eat Indian hay, but these were only partly successful. In the field it was mixed with dries and on the lines of communication it was soaked in treacle and water, 1 oz. of treacle being issued with 3 lb. of hay. Aged animals, most of which were now employed on the lines of communication, were unable to masticate it, and chaff cutters were issued to units to enable it to be cut up and mixed with other forage.

During periods of trench warfare, available grazing is soon eaten up, and it was unfortunate that, at this stage, a scarcity of forage

should have existed and that the issue of a ration with a reduced nutritive value had to be made. The situation was made worse by the hot weather and by the distances many units had to march for water. Recommendations from G.Os.C., based on the advice of administrative veterinary officers, for the re-issue of the extra 2 lb. of forage had to be refused.

During operations at Gaza, and in reconnaissances afterwards, animals were put on a mobile ration consisting of 8 lb. of grain and 4 lb. of hay, some of them being on this scale for a whole week. The larger horses and mules, of which there were approximately 3,500 over 16 hands high, suffered most from this ordeal, and a recommendation, subsequently approved, was submitted to general headquarters for an extra issue of 2 lb. of forage for such animals.

Colic was very prevalent in June; millet, which was viewed with disfavour by most commanding officers, was thought to be the cause. This led to feeding experiments being made at No. 20 Veterinary Hospital, where horses in work were fed for one month on various grain rations, of which millet formed respectively 25 per cent., 50 per cent. and 100 per cent. During these experiments there was no abdominal trouble or loss of condition. Hence, it was probable that colic in the field was due to the nature of the work and to the current season's crop of barley, which was being issued at this period.

Although up to this time the wastage in horses and mules had not been excessive, an economical policy was adopted on the lines of communication to ensure the efficiency of troops at the front. As a result of the transfer of nine divisions to other theatres of war, and a weeding out of all their unserviceable animals before embarkation, the Egyptian Expeditionary Force now had a large number of aged, war-worn and inferior horses and mules which were unable to stand the strain of operations when re-issued to field units. After the second battle of Gaza the animal wastage in various divisions at the front was compared and was found highest in those divisions with the largest percentage of old and war-worn animals. This was most noticeable in one brigade of R.F.A. of the 53rd Division, in which 33 per cent. of the horses were over 14 years of age, and in the Territorial batteries attached to the Anzac and Imperial mounted divisions which had been issued with old horses on mobilization. When the dismounted yeomanry were remounted and formed into a mounted division in Egypt, they also had to be issued with war-worn animals, with the result that they invariably had a higher sick rate and greater wastage than other mounted units. Steps were taken to return these animals when unfit to veterinary hospitals. Subsequently, on the advice of the D.V.S., the Director of Remounts decided to have these animals and certain others that for veterinary reasons were not fit for general service formed into a "B" class for duty with units on the lines of communication. Veterinary units also made a point of using draught horses in moderate condition

for transport work, and issuing them when fit to remounts instead of retaining them indefinitely. To assist the Director of Remounts in this respect, the D.V.S. or his representative inspected all animals of 15 years and over in veterinary hospitals, recommending some for the lines of communication and ordering the destruction of those not considered likely to be of any further service to the force. Animals only fit for duty on the lines of communication when issued by remount depots were branded for distinguishing purposes and in order to facilitate their disposal at the termination of the war.

At the front every effort was made to lighten the strain on horses and mules by the construction, wherever possible, of light railways and litter roads and by the avoidance of work during the heat of the day. The clipping of manes and tails during the hot weather was forbidden, since they formed a protection against flies and the sun. Thin animals were picketed separately to prevent their neighbours from eating their hay ration and to ensure their receiving extra care. They were also allowed to graze frequently. If there was no improvement under these arrangements they were transferred to veterinary hospitals. Veterinary officers were instructed to ensure that no detail in feeding and general care was overlooked. The mixing of grain with tibben and sucrapaille on tarpaulins or canvas on the ground was condemned, owing to the uneven distribution of grain, which was recommended to be placed in the nosebags after the other ingredients. It was realized that every animal would be required at a later stage of the war, and that unless every detail conducive to the maintenance of good condition was considered the mounted troops would not be able to reap the fruits of victory when the time for the offensive arrived.

The A.D.V.S. of the 52nd Division called attention to the fact that mules of 16 hands and over with first line units lost condition very rapidly when fed on the mobile ration, and that they lacked recuperative power compared with mules of small and medium size. With the object of ensuring better efficiency and less animal wastage a re-grouping of these animals was recommended. Orders were accordingly issued to all formations to exchange all large mules with R.A. units, field ambulances and first line limber or pack transport, for medium-sized mules in the divisional train, where the work was slower, and where they would not be so liable to be on the mobile ration for a prolonged period. Many of them were formed afterwards into four-in-hand teams, which resulted in greater efficiency and a considerable saving in saddlery. A spirit of competition, tactfully introduced by the Director of Transport, induced a high state of march discipline and efficiency in these units.

Complaints were received at headquarters that grooms detailed for looking after officers' chargers on the staffs of infantry formations were untrained, or only partly trained, with the result that chargers soon deteriorated. This was remedied by arranging for six men to be trained in grooming in the mobile veterinary section of each division during periods of inactivity.

During this period a combination of hunger and worn-out picketing gear was responsible for the straying of a large number of horses and mules. Consequently, to ensure their being fed and cared for pending disposal, a routine order was issued directing that they were to be handed over by the O.C. of the unit finding them to the mobile veterinary section of their formation. On the advanced lines of communication they were to be handed over to the administrative commandant of the area concerned. A description of the animals was then taken and published in orders, and if fit for service and not claimed in three days they were allotted by the G.O.C. to a unit of any formation that happened to be below establishment in animals. Stray riding and transport camels were handed over to the nearest I.C.C. or C.T.C. unit and attention was drawn to the necessity of picketing animals securely.

Many of the wells used for the watering of animals were found to be infested with leeches; to prevent the latter from gaining access to the drinking troughs, close-mesh wire gauze was fitted on to the intake pipe inside the wall, or the water was strained through fine cloth.

When troops arrived at Dier el Belah there was on the outskirts of the village a large lagoon full of water, which was found to be a favourite place for the breeding of mosquitoes and tabanidae. After all reeds and grass around and in the lagoon had been cut down, and sump holes and puddles had been filled in, experiments were made to test the palatability of the water after a spraying of the surface with a mixture of equal parts of crude oil and paraffin. When it was found that horses and mules drank the water freely, the whole lagoon was treated in this way. Later on, as the water became very low, animals refused to drink it and a chemical analysis which was made showed salinity to be 1,224 parts in 100,000. To make up for the loss of this source of supply more wells were sunk in this area.

Camels.—During this period camel-purchasing operations were being conducted in Egypt, the Sudan, Somaliland, Algeria and India. The Sudanese camels received in Cairo by rail from Khartoum were in better condition than those sent by way of Port Suez, because the latter route necessitated a long delay at the port and a cold journey by sea. A large percentage of the camels arriving by this route were in such poor condition that they had to be taken special care of at Suez for one month before they were in a fit state to march to Cairo by the old Suez road. Mange was also prevalent amongst them, but not to the same extent as among Egyptian camels.

The last consignment of Somali camels arrived in May. Their condition throughout had been good, and they were practically free from skin disease; but in the first consignment of Algerian camels, which arrived at Alexandria in March, there were numerous cases of mange, which increased our difficulties in this respect.

The only camels received from India were remounts for the Bikanir Camel Corps. These were all tested for surra on arrival,

and out of 273 camels received in January, 8 cases were discovered and they were destroyed.

Before the commencement of the Rafa operations there was time for a thorough inspection of all camel units and for the replacement of casualties, as well as for clipping and dressing for mange. The camels with infantry divisions were in good condition, but those attached to mounted units were in fair condition only as a result of their recent severe exertions. There was now ample grazing, which was freely utilized, and this, combined with the good feeding of the past year and the systematic dressing for mange in units, had a marked effect on the general health of the animals. In fact, just before the Gaza operations, they were fitter than they had ever been before.

From January to March practically the full strength of camels of the force were in fairly constant work, and the wastage for this period was compiled so that an estimate might be formed of the provision likely to be required. In calculating the total strength, the numbers in camel transport depots on the lines of communication were purposely omitted. Total strength approximately, 36,200.

Losses at the front	..	..	..	1,265
Losses in hospitals	..	..	..	1,408
Total				2,673

Average quarterly loss .. 7.10 per cent.

Annual percentage of loss calculated from these three months 28.4 ..

In February some veterinary notes* on mange were compiled and issued to every officer in camel units to help them to understand the nature of the disease and ensure their co-operation in keeping it under control. By the end of April only 30 per cent. were being dressed for mange, and the weekly issue of dressing material dropped from 10 to 2 tons. The muzzles required frequent attention, as the dressing was apt to get rubbed off during feeding, and animals had to be placed on any firm ground available to prevent absorption of the dressing by the soft sand.

A steam disinfecting train consisting of several railway trucks, which had been constructed to deal with the clothing of men affected with lice, was utilised frequently for disinfecting the clothing of camel attendants and camel rugs, which were withdrawn from units in April.

Experiments made with Cooper's Dip for the treatment of camel mange were unsuccessful, and no better results were obtained from a long and extended trial by hot calcium sulphide solution baths, which may be accounted for by the chronic nature of the disease in Egypt.

The 59th and 62nd companies of the Indian Camel Corps consisted of hired camels, and in order to simplify the claims for

* See Appendix B V.

compensation which were being made, an application was submitted to the Commander-in-Chief, India, for the taking over of all these animals by the Egyptian Expeditionary Force. This was sanctioned, and the difficulty of arriving at the number which had actually died or had been destroyed in veterinary hospitals between January, 1915, and May, 1916, was overcome by ascertaining the exact number of admissions to hospital and basing the number of those cured at 70 per cent. The average age of these camels was considerably higher than that of camels purchased from other sources ; this accounted for a high percentage of debility cases.

In March No. 3 Camel Hospital had at El Arish a detachment which received all sick camels from the front and transferred them to the main body of the hospital at El Abd. There was no grazing at El Abd and the extra 2 lb. of bulky forage was authorized for thin camels in this hospital, pending their transfer to No. 2 Camel Hospital at Kantara. As the water, grazing, and shade at El Arish were comparatively good, the whole hospital was transferred there in April, and the headquarters of No. 2 Camel Hospital was transferred in January from Ismalia to Kantara.

During this period the following points were brought to notice by administrative veterinary officers :—

- (1) The unsuitability of colonial saddles for Arab ponies issued to yeomanry regiments used on the West Front.
- (2) The greater prevalence in some units of debility due to overwork, under strength in horses, too large a percentage of old horses, marching too frequently to water when it was a considerable distance from the camp, and to animals being kept too long on the mobile ration.
- (3) The advisability of re-distributing mules in field units to ensure greater efficiency and to reduce wastage.
- (4) The desirability of not working animals during the heat of the day during the summer months.
- (5) The need for prohibiting the clipping of manes and tails to ensure protection from flies and heat.
- (6) The necessity for a periodical cleansing of canvas water-troughs and for the supply of separate water-troughs for catarrh cases.
- (7) Animals not being shod up to date through units being below establishment in shoeing-smiths.
- (8) The necessity of field forges to ensure satisfactory shoeing.
- (9) The necessity of leather soles for horses working in ordnance depots and compressed fodder factories on the lines of communication to protect their feet from loose nails.

Stores.—With a view to reducing demands for freight as much as possible, all administrative services were instructed to purchase as many stores as they could through the Local Resources Board.

Veterinary demands were not very large compared with others, and such articles as wool, tow, flax, boric acid, soda, gum arabic, camphor, turpentine, vaseline, cotton seed oil, and rape oil were obtainable at reasonable prices. There was a shortage of cotton wool in the early months of the year, but this was overcome by utilizing fine tow wherever possible until a supply of wool was received from England. Several tons of sulphur were obtained from Italy through the Director of Supplies and Transport, who also handed over 100 tons of whale oil sent out to Egypt for other purposes. When this was expended, whale oil was obtained through the Director of Ordnance Services. Farriers' wallets were made locally and scalpels, forceps and syringes to complete them were obtained from the Medical Store Depot at Alexandria. Veterinary stores were supplied to the Sheriff of Mecca and to the Sudan Government.

A large consignment of stores, which included 10 officers' chests, was lost at sea in March, and a further large consignment was destroyed by fire at Kantara in May before it was handed over to the veterinary service. These losses, and an unusual delay in stores arriving from home in May, caused much anxiety at the time and the strictest economy had to be observed pending their arrival.

The contents of units' chests for camel units were modified to make them more suitable for dealing with the prevailing injuries to these animals. The number of bandages in each chest was reduced to 20, and 12 packets of Eusol were added, the remaining space being filled with tow.

From January to the end of May the Advance Base Depot of Veterinary Stores was located at Kantara, and as at that time stores were being lost en route to units in the field, instructions were issued for indents to reach Kantara on Wednesdays, after which the stores were sent in charge of an N.C.O. to the Field Veterinary Detachment at Rafa, where they were collected by field units. The Advance Base Depot of Veterinary Stores was transferred to Rafa on June 3rd.

The veterinary equipment sent from India with the Indian brigades and regiments was different from that issued to similar units in the Egyptian Expeditionary Force, and it was also not so suitable. When the Indian brigades had expended their supplies they were brought on to the same scale as other units of the Egyptian Expeditionary Force.

Veterinary Statistics, January to June, 1917.

The average strength of the force during this period was :—

Horses and mules	..	..	..	..	59,357
Camels	..	..	..	..	44,077

The actual wastage from all causes (died, destroyed, missing and sold) was :—

Horses and mules	2,799	representing	4.71	per cent.
Camels	.. .. 5,580	„	12.66	„

Of the camels, 1,386 were cast and sold, but the cast horses and mules, which in other theatres of war would have been sold, were destroyed under War Office instructions.

The total number of cases which received veterinary treatment was 110,759, of which 38,368 were horses and mules, and 72,391 were camels.

A large proportion of the heavy sick list among camels was due to mange, but although this disease was necessarily recorded and was under constant treatment it was not considered a cause of disability for work except in extreme cases. Hitherto mange had not been prevalent in horses and mules, but there was now a slight increase in the number treated, though it was very small and was always well under control. Of the above-mentioned number of cases that received treatment 41,488 were sent to veterinary hospitals, of which 23,087 (38·89 per cent. of the force) were horses and mules and 18,401 (41·74 per cent. of the force) were camels.

On June 30th there remained under treatment 5,731 (9·65 per cent. of the force), horses and mules and 21,850 (49·64 per cent. of the force), camels mostly suffering from mange, of which 4,464 (7·52 per cent. of the force, horses and mules) and 4,262 (9·66 per cent. of the force, camels) were in hospital.

1. *Horses and Mules*.—Compared with 1916 the loss in horses and mules was reduced by 3 per cent.

(a) Wounds and injuries.—Mortality 929, representing about 1·6 per cent. of total strength of animals.

(b) Lameness.—Mortality 506, about ·85 per cent. of total strength.

(c) Digestive diseases.—Mortality 296.

(d) General diseases.—Mortality 174.

The majority of the loss in (c) and (d) was due to sand colic and debility, two conditions which react on each other considerably. The resulting loss represents about ·79 per cent. of the total strength.

(e) Respiratory diseases.—Mortality 203, about ·34 per cent. of the total strength.

This class includes catarrh and pneumonia, and most of the cases naturally occurred among remounts. Climatic conditions affected this class of disease favourably, and the close co-operation of the Remount Service ensured all cases being transferred to hospital as soon as detected; otherwise the mortality would undoubtedly have been heavier.

(f) Contagious diseases.—Mortality 79, ·13 per cent. of the total strength.

Chief in this class was glanders, which during the period under review was introduced by remounts from America, by horses from France and Algeria, and by animals captured from the enemy.

2. *Camels*.—During 1916 the camel wastage was about 11 per cent. of the strength, but this small proportion was due to the fact that at that period the Camel Corps, both Imperial and Transport,

were in process of formation, and the full number of animals was not in constant work.

Chief causes of loss—

(a) Wounds and injuries.—Mortality 2,251, 5·1 per cent. of the total strength.

(b) General diseases.—Mortality 1,961 (chiefly worn out and debilitated), about 4·44 per cent. of the total strength.

One hundred and fifty-one camels died of heat apoplexy at Rafa and Belah.

(c) Contagious diseases (mange not included).—Mortality 293, ·66 per cent., mainly tuberculosis, filariasis and trypanosomiasis.

(d) Skin diseases.—Mortality 69.

This is included only to show the number lost under this heading, which in the circumstances was considered to be small.

(e) Digestive diseases accounted for 239.

(f) Lameness accounted for 84.

(g) Eye diseases accounted for 99.

Blindness was of comparatively common occurrence in the camel, both from external injury and from internal causes.

As noted at the beginning of this report, 1,386 camels were sold, the majority to butchers; owing to the local demand for meat those in good condition fetched large amounts, in some instances more than their original price.

EGYPTIAN EXPEDITIONARY FORCE.

July to December, 1917.

The check received at Gaza was severe, and it was evident that a much larger force was needed to defeat a strongly reinforced enemy in an entrenched position. To this end the E.E.F. was reorganized and strengthened so that it was finally enabled to overcome all opposition. General Sir Edmund H. H. Allenby took over the command of the E.E.F. at the end of June, 1917. Under his direction the available infantry was formed into two army corps, and the cavalry of the desert column was formed into a cavalry corps of three divisions. Two infantry divisions (the 10th and 60th) and some mounted brigades were transferred from Salonika, and several batteries of R.G.A. (mountain, heavy and siege) were received from home. Thus, by October the reorganized force consisted of:—

<i>XX Army Corps</i>	..	..	A.D.V.S.	Major (temporary Lieut.-Colonel) W. J. Dale, A.V.C.
10th Division	..	..	..	Captain (temporary Major) G. Lloyd, A.V.C. (S.R.).
53rd	..	..	..	Captain (temporary Major) S. J. Williams, A.V.C. (T.F.).
60th	..	..	..	Captain (temporary Major) R. Wynne Williams, A.V.C. (T.F.).
74th	..	..	..	Captain (temporary Major) G. McIntyre, A.V.C. (T.F.).
23 batteries R.G.A.				

<i>XXI Army Corps</i>	..	..	A.D.V.S.	Captain (temporary Lieut.-Colonel) P. J. Simpson, A.V.C. (T.F.).
52nd Division	..	..	"	Captain (temporary Major) J. Adamson, M.C., A.V.C. (T.F.).
54th	"	..	"	Captain (temporary Major) A. C. Duncan, A.V.C. (T.F.).
75th	"	..	"	Captain (temporary Major) H. E. Powell, A.V.C. (T.F.).

18 batteries R.G.A.

Army Cavalry :—Imperial Service Cavalry Brigade (Jodhpur, Mysore, and Hyderabad Lancers).

Desert Mounted Corps	..	A.D.V.S.	Major (temporary Lieut.-Colonel) E. P. Argyle.
Australian and New Zealand Mounted Division.	..	"	Major E. Murray Jones, A.A.V.C.
Australian Mounted Division	..	"	Major J. Kendall, A.A.V.C.
Yeomanry	"	"	Captain (temporary Major) F. W. C. Drinkwater, A.V.C. (T.F.).

7th Mounted Brigade.

Imperial Camel Corps Brigade.

The enemy's main position at Gaza had been converted into a strong modern fortress, heavily entrenched and wired, and the remainder of his line consisted of a series of strong groups of positions at Sihan, Atawineh, Abu Hariera-Arab el Teeaha and Beersheba, extending from the sea to a point south of Sharia, a distance of about thirty miles.

The British line was extended, on a front of twenty-two miles, from the sea at Gaza to a point on the Wadi Ghuzzi near El Gamli, about fourteen miles south-west of Sharia and eighteen miles west of Beersheba. This is practically the southern edge of the plain of Philistia, and from this line, for eighty miles northwards, topographical conditions are remarkably constant. Along the sea coast there is a belt of sand dunes, varying from two to four miles in width, which is impassable for wheeled traffic. The plain of Philistia extends as far north of Jaffa, where it is continued by the plain of Sharon to Mount Carmel, both plains being fifteen to twenty miles wide and lying between the sand dunes and the Judæan hills. These plains are for the most part undulating down-land and grow excellent crops of barley between April and June; they are admirably suited for the employment of mounted troops. They are sparsely populated, and the inhabitants find ample water for their small needs in village wells. The plains are intersected by numerous wadis, which are the only serious obstacles to the movement of troops. During the dry season these wadis are crossed comparatively easily by cavalry, but they are impassable during the rains, which transform them into raging torrents rushing down from the hills. The Judæan mountains, a ridge of bare rocky hills intersected by numerous wadis and rising to a height of 3,000 ft., run northwards from Beersheba.

As the water supply played a most important part in the plan of operations, and had a marked effect on animal wastage, a brief review of the supplies available and their subsequent development,

distribution and storage will not be out of place. After the second battle of Gaza we held on to the Wadi Ghuzzi and developed a good supply of water for animals of the force to the south of the town. The Turks destroyed three wells at Khalassa and one at Asluj, but left an excellent supply of water at Essani and Shellal. At the latter place, springs yielding about 14,000 gallons an hour of slightly saline water were developed and distributed through pipes over a large area, while a natural rock basin, improved by a masonry dam, provided storage for some 500,000 gallons. A pipe line was laid forward from Shellal to Imara, and engines and pumps were installed for local distribution. The pipe line from Kantara was connected up with Shellal and the wells at Dier el Belah were connected up with the trenches south of Gaza. Numerous pumping stations were erected, and deep bore wells were sunk at various points along the line. At intervals along the Wadi Ghuzzi a total of over 3,000 running feet of masonry and wood troughs was provided for watering horses and camels. At Shellal, a fantasse filling area, in which 200 of these receptacles could be filled and loaded on camels, was organized, and everything likely to be required for water distribution—piping, canvas tanks, watering troughs—was held in readiness for the advance. Until October 22nd no troops or animals watered east of the Wadi Ghuzzi. After that date troops began to move eastward to take up their position for the attack on Beersheba, and between October 22nd and November 1st formations developed water supplies or made storage arrangements at the following places :—

XXI Army Corps	..	Mendur to Sheik Ajilin.
XX Army Corps	..	Esani, Imara, Karm, Khasif.
Desert Mounted Corps	..	Abu Ghalyun, Malaga, Khalassa, Asluj.

The above arrangements involved a great deal of work on the part of the Royal Engineers, and were necessary in order to keep the troops supplied while operating at considerable distances from their original water base for a period which might amount to a week or more. It was known that an ample supply of water existed at Beersheba, but it was uncertain how quickly it could be developed or to what extent the enemy might have damaged the wells before we succeeded in capturing the town. The force which would be based temporarily on this town required 400,000 gallons a day, and it was known that no other water existed for the second phase of the operations until Sheria and Hareira had been captured. Practically the whole of the transport of the force, including 30,000 pack camels, had to be allotted to the eastern part of the force in the preliminary arrangements for water, food and ammunition.

Between July and October the mobility of mounted troops was tested frequently by the issue of surprise orders for brigades or regiments to turn out ready for operations and for rendezvous at stated places. The time taken by each unit to turn out was noted by staff officers, and keen rivalry sprang up between different units

to obtain the best results. The amount of rations for man and animal was worked out, and it was finally settled that horses should carry 19 lb. of grain in two nosebags on each saddle (equivalent to two days' mobile ration), while a third day's ration was carried in limbered G.S. wagons.

In addition to the above tests, the cavalry division in the advanced line made fortnightly reconnaissances towards Beersheba. During these reconnaissances, which entailed two nights and one day of almost continual movement without any sleep or rest, it was not uncommon for regiments to cover seventy miles or more. The long marches over rough and rocky country, with the thermometer registering 110° F. in the shade, and the absence of water, which was not available from the afternoon of the day on which the division moved out till the evening of the following day, resulted in a temporary loss of condition from which horses took a week to ten days to recover. There were repeated casualties from bombs and light guns skilfully brought out to concealed positions, from which the enemy carefully registered all high ground and wadi crossings. The result of this series of reconnaissances to the west and south-west of Beersheba was that every commanding officer gained a thorough knowledge of the country; this training was of the highest value in the subsequent operations. On one occasion the D.V.S. went on one of these reconnaissances to ascertain the possibility of watering sick animals during the process of evacuation and to observe the effect of the work on the condition of the animals engaged.

Towards the end of October these long and careful preliminary preparations were completed, and the troops began to move to their concentration areas. The Commander-in-Chief's plan was to strike a main blow on the enemy's left flank at Beersheba, then to deploy and attack his flank so as to force him to abandon his fortified positions, to follow this up with an attack on Gaza, and finally to use his mounted troops in pursuit of the enemy to Junction Station, approximately forty miles distant from the British lines.

On account of the strenuous nature of the proposed operations, combined with the formidable water and transport difficulties, animal casualties were expected to be heavy, and the following veterinary arrangements were made :—

- (1) As many animals as possible were evacuated from veterinary hospitals in order to fit out the force and make room for casualties.
- (2) The field veterinary detachment at Rafa was doubled in strength by attaching officers, N.C.Os. and men from veterinary units on the lines of communication and 200 Egyptians, who were obtained for temporary duty from the Egyptian Labour Corps. One thousand horse-rugs, extra nosebags, picketing gear, and camp equipment for 500 animals were obtained from ordnance.
- (3) Veterinary posts, consisting of 1 officer, 1 serjeant, 2 corporals, 5 privates A.V.C., and 50 Egyptian Labour

Corps, with picketing gear for 150 animals, were established at Shellal and Belah to receive and despatch horses brought in by mobile veterinary sections, thus enabling them to rejoin their formation without the great delay which escorting horses down the line would entail under prevailing conditions:

- (4) Egyptian personnel and ordnance stores sufficient for one horse and one camel hospital were earmarked in case the present hospital accommodation was found to be insufficient.
- (5) Large quantities of veterinary stores, including a good supply of 25 lb. unit chests and mange dressing for camels, were held in reserve at the Advance Base Depot of Veterinary Stores at Rafa.
- (6) Arrangements were made with the D.R.T. to hold trucks at Belah to evacuate casualties to Kantara and to have loading ramps in readiness at convenient places on the military railway as soon as possible after its construction behind the advancing troops.
- (7) Instructions were also issued to the effect that, in the event of the early fall of Beersheba, animals would be evacuated from Imara or Karm as soon as the railhead reached there ; but in the event of operations being prolonged, mounted formations would evacuate sick animals via Esani or Gamli, where water was available.

The preliminary operations entailed mounted troops making a considerable detour round the enemy's left flank, and it was expected that the first large batch of casualties, after the taking of Beersheba, would be sent straight across to Shellal. In case the railhead had to be moved further east, arrangements were made for a ramp to be put up as soon as the new station opened, so that mobile veterinary sections would not have to march further than Imara or, possibly, Karm.

The attack on Beersheba necessitated for the cavalry a night march of twenty-five to thirty-five miles to enable them to reach their positions to the east and north-east of Beersheba, from which point they were to commence the attack. The horses were watered before marching on October 30th, and were unable to water again until Beersheba had been captured. On the 31st troops were occupied all day in attacking the outer defences. In one of these attacks two regiments of the Australian Light Horse, in line of troops at wide intervals, galloped over an open plain, two miles in width, in face of a fierce fire from several Turkish batteries, and sustained practically no casualties in horses or men. Later in the day, under cover of gunfire by the R.H.A., two regiments of the 4th Australian Light Horse Brigade, in line of squadrons, galloped at racing speed straight over the trenches of the inner defences of Beersheba, where they dismounted and bayoneted the Turks in the trenches. One horse only was wounded during this remarkable charge, which was all over in ten minutes.

Of the seventeen wells in Beersheba two were found to be entirely demolished, two were partly damaged, and in three the engines had been put out of action. The other wells had been prepared for demolition, with the fuses ready for lighting. After removal of these fuses, the Royal Engineers erected five engines and three pumps, repaired one engine which had been damaged by the Turks, and erected pumping sets brought in from Asluj. During the first two days after the occupation, rain water from the previous week's storm was found collected in shallow pools and pits dug in the wadi to the west of the town, but this was soon exhausted. The output was just equal to the demand up to the fourth day, when water development reached its maximum, the total output being about 390,000 gallons a day. At first an attempt was made to cut down the ration of water for horses by imposing a time limit for each batch as it came to the troughs. This plan was a failure, as the famished horses, which had not been watered for thirty-six hours, got out of control and rushed the troughs as soon as they got near them. To prevent a repetition of this, a stout guard rail was erected to every line of troughing. There was no difficulty in limiting the ration of water for camels, as they invariably drink in two bouts, with an interval of ten minutes between each.

During the concentration of troops for the main attack on Sharia and Hareira, water was developed wherever possible, and water convoys were organized to enable troops to subsist in this barren part of the country, which was quite unsuitable for mounted work. Water and food were very scarce, and during the three days and three nights of incessant fighting between December 2nd and 5th the horses had to be sent back daily twenty-eight miles to Beersheba to water. Some of the brigades were only able to give their horses one good drink during the four days they were in this area. The severe work and the great difficulty in watering had a serious effect on the condition of the horses, especially in view of the coming operations. The original plan of the Commander-in-Chief was framed to include cavalry exploitation as its final decisive act. This necessitated perfect timing and a maximum number of horses in good condition, but as a result of the privations of these few days, only six of the eleven brigades of the Desert Mounted Corps were present for the exploitation and their animals were far from fit. The unfit brigades were formed into a reserve corps and were returned to areas where facilities for watering and feeding existed. When revived, they were marched to the front to replace others unable to carry on the pursuit because of the fatigue and distress of their horses. The water situation to the north of Sharia was not much better, as this country is sparsely populated and the few wells to be found were of great depth and with a poor yield. The enemy was well aware of this and adopted tactics to suit the occasion. He knew that if he could keep our cavalry from water for forty-eight hours it would have to be withdrawn from the pursuit, during which time his infantry could outmarch our infantry. He

put up a strong rearguard resistance but our mounted troops, in spite of the long marches on very limited forage and water, attacked and drove him on relentlessly.

On November 8th, during a rearguard action at Huj, where the Turks were in a very strong defensive position, the Warwick and Worcester Yeomanry charged in column of half squadrons over some 1,500 yards under a hail of shell fire, rifle and machine-gun bullets, and captured one battery of 5·9 in. howitzers, one Austrian F.A. battery, one mountain battery and four machine-guns, also killing a large number of Turks and taking about seventy prisoners. Owing to fire support not being available, our casualties, mostly due to machine-gun fire, were heavy, and out of 170 horses which took part in the charge, 100 were killed.

Two wells 150 ft. deep were found at Huj, but as the Turks had destroyed the winding apparatus, water for the horses could only be obtained by the laborious process of letting down and hauling up by hand a few small canvas buckets attached to a length of field telephone wire. Most of the horses had been without water since the afternoon of the 6th and were raging with thirst, but it took over one hour to water one troop, and all night as well as the following day was spent in watering a mounted division.

On November 11th the mounted troops were again called upon to take a strongly entrenched position at El Mughar, where the Dorset and Bucks Yeomanry, under cover of R.H.A. and machine-gun fire, charged a steep ridge and killed over 400 Turks with the sword alone. They also took 360 prisoners, three field guns and a large number of machine guns. The end of the charge was up a steep hill, which completely exhausted the horses. Our losses, mostly due to machine-gun fire, were :—

Killed and wounded.

Officers and men	..	..	129 (about 16 per cent.)
Horses	..	..	265 (about 33 per cent.)
Mules	..	..	2

Junction Station was occupied on November 14th and was the first place where unlimited accessible water was found. Operations had now continued for seventeen days practically without intermission, and a rest for the horses was absolutely essential. Although Junction Station is only 60 miles from Beersheba, most of the cavalry had covered nearly 170 miles since October 29th. They had captured 5,270 prisoners, over 60 guns and about 50 machine guns, while the enemy had just managed to avoid complete annihilation. The heat had been intense and the effect of a scarcity of water, with a grain ration of only 9½ lb. a day and practically no bulky food, was beginning to be evident, for each horse carried an average weight of 21 stone. In keeping a sufficient number of horses fit enough to carry on the offensive in such extremely trying circumstances after a limited period of rest, the mounted troops established a remarkable record.

Just prior to the arrival of the force at Junction Station, the problem of the forage supply became pressing. The Turks had blown up bridges and portions of the railway during the retreat, and our only means of supply was by motor lorries and camels along the single, narrow, ill metalled road between Gaza and Junction Station. Parts of the road were badly damaged and deep in sand, which the lorries had great difficulty in traversing even with the light load of one ton. Over 100 tons of grain (at $9\frac{1}{2}$ lb. a day for each horse) were required for the cavalry alone, and in addition rations were required for men and food and forage for the infantry. In the circumstances only two divisions (the 52nd and 75th) of the XXI Army Corps were able to advance. All available lorries and camels were organized in convoys along the Gaza-Junction Station road, from Dier el Belah to El Mejdal, whence the supplies were distributed to divisions by horse and mule-drawn wagons of the divisional trains. These unfortunate animals had heavier work than those in any other part of the force, as they were distributing supplies from nightfall till dawn, whilst those of the divisional ammunition columns fared very little better. Some relief was obtained at Wadi Sukereir and later at Jaffa, where forage was drawn from a sea-borne supply, but as this had to be landed in surf boats and was dependent on the weather, the amount was necessarily limited.

Relays of sappers were now working night and day on the railway, which under the most favourable conditions would take at least a fortnight to reach a point where it would be possible to supply troops for the final part of the advance in those operations.

On November 19th, after four days' comparative rest, the advance on Jerusalem was undertaken by part of the Desert Mounted Corps and the XXI Army Corps, whilst the 53rd Division of the XX Army Corps advanced on the Hebron road from the south. Further operations, resulting in the surrender of Jerusalem on December 9th, were undertaken by the 74th, 60th and 53rd Divisions. On the intended line of advance there was only one good road, the main Jaffa-Jerusalem road, which traverses the Judaeian Hills from east to west. The other roads to Jerusalem were mere tracks on the sides of hills or along the stony beds of wadis and were quite impracticable for wheeled transport until improvement could be made. The country is a maze of high rocky ridges running in all directions and separated by deep narrow ravines, the sides of which are almost precipitous, and all approaches were commanded by a series of strong defence positions located in the mountains.

To add to our difficulties a heavy rainfall commenced on the day of the advance and continued almost incessantly till the end of December. There was also a considerable drop in the temperature, which was a severe trial to men and animals, since the former had no great coats or blankets and the latter had no rugs. Cavalry, as such, were seldom able to operate in this mountainous country; it was only possible to employ them in dashing raids when circumstances permitted. To most mounted units horses were an

encumbrance, as they were unable to cross the valleys, which had been converted into beds of viscid black mud, while the ravines had now become raging torrents.

The indifferently metalled roads from Gaza to Junction Station and from Jaffa to Jerusalem were not equal to the strain of motor lorries, and soon became unusable. The plains became a vast spongy quagmire, over which the camels were unable to march. Many of them fell and broke their legs in the attempt, while several sank up to their girths and had to be abandoned. Those which had reached the hills were quite unsuitable for work on the rough stony sides, and the transport of each corps had to be supplemented by 2,000 donkeys to assist in forwarding supplies to the advanced positions.

The supply of rations and of other necessities of life for the men had now become precarious, and the transport of forage, except in very limited quantities, was impossible under such conditions. Horses, already thin and exhausted after the heavy strain of the past month, had to stand up to their hocks in mud, exposed to cold, biting winds, on less than half rations, with the result that they went from bad to worse, and many became almost skeletons. A large quantity of forage had been ruined by the rains : over 900 tons of crushed gram was lost through fermentation, while much of the barley was sprouting and mouldy, and the dries and tibben had become sodden and musty. Infantry divisions were sent up to relieve the mounted formations, which were sent back to suitable camps on the sand dunes near the sea, where it was possible to water and feed them. During the withdrawal, regimental transport took twenty hours to travel twelve miles, and horses and men had the greatest difficulty in keeping their footing. The streams and rivers were unfordable ; the black, soft soil seemed bottomless. Many animals collapsed from starvation and exhaustion, and had to be abandoned. Notwithstanding such obstacles, stout hearts, resourceful brains and a wonderful determination to overcome all difficulties prevailed, and it is to the lasting credit both of officers and men that they reached their camps at all.

It will be gathered from the foregoing narrative that weather conditions during this period varied from tropical heat to extreme cold, and from drought to torrential rains ; that during the heat horses had to work for long periods without water ; and that when the rains came the military situation, combined with floods and mud, prevented the regular supply of full requirements of forage. A very slight variation of the water content of the cells of the body is likely to be accompanied by disturbances in tissue metabolism, and, if continued long enough, will lead to a definite and visible change in health. A reduced water supply interferes with the absorption of, and prolongs the retention of, nitrogenous products of metabolism, while an insufficient quantity of water produces inappetence for food, and may produce gastro-intestinal disturbance. The effects of a reduced forage ration are not so pronounced as those of a shortage

	(1)	(2)	(3)	(4)
Formation or Unit.	Longest continuous period without water.	Work performed during this period.	If they fed when thirsty.	Average number of times they were watered daily.
<i>Desert Mounted Corps.</i>				
Australian and New Zealand Mounted Division.	72 hours	Continuous	Up to 36 hours	November, once
Australian Mounted Division	72 "	"	No	December, twice
<i>Yeomanry Mounted Division.</i>				
6th Mtd. Bde. Bucks. Yeo. ..	72 "	"	Yes	November, once
				December, twice
6th " " Berks Yeo. ..	60 "	"	No	Once daily ..
6th " " Dorset Yeo. ..	54 "	60 miles	Yes	" " "
8th Mounted Brigade ..	52 "	Continuous	Yes	November, once
				December, twice
22nd Mtd. Bde. Staffs. Yeo. ..	36 "	"	Yes	Once daily ..
22nd " " Lincoln Yeo.	84 "	"	No	" " "
22nd " " E. Riding Yeo.	50 "	23 miles	Yes	" " "
7th Mounted Brigade ..	50 "	24 miles	Up to 36 hours.	November, once
<i>20th Army Corps.</i>				
10th Division	36 hours average.	Continuous	Yes	December, twice
53rd " " " " ..	56 hours	"	Yes	1½ times daily
60th " " " " ..	65 "	"	Not after 30 hours	Twice
74th " " " " ..	44 "	5 to 15 mile marches.	Yes	Once
<i>21st Army Corps.</i>				
52nd Division	40 "	18 miles	Yes	1½ times daily
54th " " " " ..	36 "	20 miles	Yes	Once
75th " " " " ..	40 "	Continuous	Yes	Twice
20th Brigade, R.H.A. ..	56 "	50 miles	Yes	Once
				Once daily ..
1/2nd County London Yeo. ..	56 "	Continuous	Yes	Once
B.Q. Cable Section	68 "	"	No	Twice
54th Divisional Train ..	63 "	50 miles	Yes	Twice
100th H.A. Group :—				
15th H.B. " " " " ..	45 "	Continuous	Yes	Twice
181st H.B. " " " " ..	50 "	"	Yes	November, once
				December, twice
				Twice

(5)		(6)		(7)	(8)
Smallest amount of grain and fodder received during any one period.		Average amount of grain and fodder received daily.		To what extent ration could be supplemented by grazing, requisition or purchase.	Time when any change in condition was first noticed.
Grain. 4 lb.	Fodder. Nil.	Grain. 9 lb.	Fodder. 4 lb.	4 lb. tiben average. No grazing. About 2 lb. tiben four days a week.	Fell off after 36 hours without water. 14/11/17.
6 lb.	Nil.	8 lb.	Nov., 2 lb. Dec., 8 lb.		
9 lb. for 72 hours	Nil.	10 lb. grain and fodder till Nov. 26; 15 to 20 lb. afterwards.		No grazing, forage obtained locally once.	End of first week.
9 lb. for 72 hours.	Nil.	10-12 lb. grain principally gram.		4 days tiben, 1 day barley. No grazing.	7/11/17.
5 lb.	Nil.	9 lb. grain; occasionally a little tiben.		Very little grazing, 7 lb. grain and tiben, locally once.	After period without water.
4 lb. on four occasions.	Nil.	About 7 lb. grain and no fodder while on the move. Full rations from Dec. 3 practically.		A little tiben only. No grazing.	7/11/17.
Nil on Nov. 19 and 20.		About 9½ lb., Nov.; 12 lb. grain, 10 lb. fodder, Dec.		Some tiben occasionally. No grazing.	10/11/17.
Nil for 3 days		5 lb. during Nov.; maximum 9 lb. grain and 3 lb. hay from Nov. 1-5.		Small amount of tiben obtained from villages.	11/11/17.
Nil for 3 days		Nov. 1-31, Nov. 1-31, 9 lb. Nil.		No grazing; a very little tiben and a quantity of millet at Huj.	After period without food.
6 lb.	Nil.	Nov., 9 lb.	Nil	A little tiben ..	3/11/17.
5 lb.	Nil.	10½ lb.	3 lb.	Not at all ..	At end of Dec.
5 lb.	Nil.	7 lb.	2 lb.	A little grain and tiben.	12/11/17.
6 lb.	Com- bined.	7 lb.	2 lb.	" "	6/12/17.
4 lb.	Nil.	9 lb.	5 lb.	Not at all ..	14/11/17.
2½ lb.	1½ lb.	7½ lb.	3½ lb.	On 5 days up to about half rations. No grazing.	20/11/17.
2 lb.	Nil.	7½ lb.	7 lb.	No grain. Some units a little grazing.	23/11/17.
5 lb.	2 lb.	7 lb.	6 lb.	A little tiben and grain.	15/11/17.
4½ lb.	Nil.	9 lb. during Nov. ..		Considerable amount of grain on three occasions and a little tiben sometimes.	9/11/17.
5 lb.	Nil.	9 lb.	4 lb.	Not at all ..	10/11/17.
6 lb.	Nil.	6 lb.	6 lb.	Nil	During period without water.
6 lb.	Nil.	10 lb.	7 lb.	A little grazing ..	20/11/17.
5 lb.	2 lb.	6 lb.	4 lb.	" "	3/11/17.
8 lb.	3 lb.	10 lb.	6 lb.	Not at all ..	3/11/17.

of water, but the results are just as destructive in the end, when symptoms of starvation in all phases are produced. The animals of our mounted formations were subjected to a combination of the above privations, and, although the untoward effects were apparent to all, not only had they to face severe exposure to wet and cold, but were deprived of necessary rest through being unable to lie down on account of the thick mud.

With the object of obtaining some precise data as to the hardships endured by the animals of the force, the D.V.S. wrote to the G.Os.C. the Corps asking for the following details as regards the animals of the units concerned during the period November 1st, 1917, to December 31st, 1917, viz. :—

- (1) The longest period during which the animals were continuously without water.
- (2) The work they performed during this period.
- (3) Whether they fed well when thirsty.
- (4) The average number of times they were watered daily during the period specified or during any intermediate period.
- (5) The smallest amount of grain and fodder they received at any time and for what period.
- (6) The average amount of grain and fodder they received during the whole or any intermediate period.
- (7) The maximum amount of grain and fodder they received at any time and for what period.
- (8) To what extent units were able to supplement their forage locally by grazing or otherwise.
- (9) When did any noticeable change take place in their condition and vigour, as a result of work and privation.

The replies received are tabulated in the schedule on pages 208 and 209, and the information given is of exceptional interest.

The animal cost of these operations (from October 31st to December 31st), based on the returns received up to December 31st, was approximately 10,000 casualties in horses, mules and donkeys, which represents 11·5 per cent. of the strength. Of these casualties half were a dead loss (died, killed, or missing in the field), the remainder being evacuated to veterinary units on the lines of communication. As is always the case, the effects of strenuous operations on animals is more apparent in the returns received some time afterwards, and if 8·25 per cent. of the casualties for the succeeding month (January, 1918) were added to the above, it would perhaps represent a more exact estimate. These were :—

	<i>Died, killed, or missing during January, 1918.</i>	<i>Transferred to Veterinary units.</i>
Horses, mules and donkeys..	2,684	5,677

Even with this addition, the approximate cost is only 16·5 per cent., which includes a dead loss of 50 per cent. It was only the unremitting attention of all formations and all ranks concerned

that prevented more serious loss and restored to good health and condition the war-worn animals remaining on the strength of units. Very few of the animals, even after the worst cases had been transferred to veterinary units, were fit for active work in January, but there was a change for the better by February when they were again called upon for strenuous duty beyond the Jordan valley.

The work of the mobile veterinary sections and field veterinary detachments throughout the operations calls for special notice. After the fall of Beersheba, when mounted troops had taken up the pursuit of the enemy, only one division remained in this area. On November 15th the veterinary post at Shellal was transferred to Karm, where a railhead had been established. By this time the number of sick for evacuation had been reduced considerably, and half the personnel of this post was transferred to the coastal line of advance, where a further reorganization of veterinary arrangements was made. The field veterinary detachment was transferred from Rafa to Dier el Belah, where camp accommodation for 500 animals was arranged, from which point they were transferred by train to Kantara. After the fall of Gaza a post was established about a mile to the north of that town and a further one at Dier Sineid, to each of which an additional fifty Egyptians of the Egyptian Labour Corps were attached. Beyond this point mobile veterinary sections were posted at regular intervals on supply routes along the Junction Station, Ramleh and Jerusalem roads. The distance from the front to a railhead for horses was now approximately sixty miles. Many of the horses were much exhausted and unable to travel more than a few miles daily, but by means of the field veterinary detachment and its advanced posts the journeys to mobile veterinary sections were shortened considerably. The rest and care the animals thus received during the tedious evacuation were the means of saving a large number of cases which would otherwise have succumbed: the good results of these arrangements appear from the fact that up to December 1st only 45 out of 3,000 animals (1·5 per cent.) were lost during transit.

On December 15th the veterinary post at Karm was withdrawn, but those at Gaza and Dier Sineid continued to function up to the end of January, on which date all A.V.C. and Egyptian Labour Corps personnel attached to the field veterinary detachment for the operations were returned to their respective units.

In a special order of the day, issued on the surrender of Jerusalem, the General Officer Commanding-in-Chief remarked:—"The Veterinary Service worked well throughout, the wastage in animals was consequently small considering the distance traversed."

Loss of condition was general among the animals at the front, even after the evacuation of the worst cases, and very few were fit for active work until February. The degree of disability naturally varied in different units, as well as in the different mounted corps, according to the hardships endured and the number of aged animals on their strength. The horses of the Yeomanry Mounted Division,

on their return from the forward area near Jerusalem, were exhausted and debilitated to a dangerous extent. All horseshoes and nails had been used up or left behind to relieve transport, with the result that many animals were lame from broken and bruised feet through marching over the rough rocks on the hills. Diarrhoea was very prevalent in all mounted formations, as a result of the animals being fed almost exclusively on gram, which was the only grain available during the greater part of the pursuit.

The horses of the artillery, both of the batteries and divisional ammunition columns, suffered the worst and took the longest to recover, notwithstanding the special care they received.

The important effect of periodical dressings for mange on camel efficiency was brought prominently to notice during these operations. By the time Junction Station had been taken the whole of the Imperial Camel Brigade, both camels and men, had to be withdrawn for rest and treatment. The camels suffered from generalised sarcoptic mange to such an extent that the men also had become infected. The conditions under which this brigade had been operating since October 27th prevented any treatment for mange being carried out, and the animals had to be marched to Shellal and put under a long course of treatment. The D.V.S. recommended that the whole of the 5,000 camels should be taken over by the veterinary service and that an extra hospital should be formed for their treatment. This, however, could not be done at the time, and consequently the worst cases only were transferred to hospital, and special Egyptian personnel, recruited through the A.V.C. and C.T.C., was attached to the brigade until the disease was got under control and the animals were restored to good condition.

It was now found necessary to increase the establishment of the Camel Mobile Veterinary Section to enable it to cope with mange, whilst the European personnel of the brigade was employed in active operations.

In December, the prevalence of mange in the camels of the Desert Mounted Corps, and the difficulty of keeping it under control, necessitated an increase of personnel, and an additional A.V.C. serjeant, 8 clippers and 8 dressers were posted to the corps.

The camels of the XXI Army Corps transport that worked in the sandy area along the coast had very few casualties, but those working further inland on the plains and in the hills suffered severely. Up to December 1st they were properly fed and did exceptionally well; but after this date the average maximum daily ration for long periods was only 5 lb. of grain, while on rare occasions only did they receive any tibben, and as a result they lost condition considerably.

Attention has already been drawn to the effect of the rains on the condition of the ground in greatly increasing the difficulty of marching over the muddy plains and up and down the steep Judæan hills, where camel camps were frequently and unavoidably pitched on windswept sites at altitudes of 3,000 ft. The biting night winds and the showers of ice-cold rain severely affected the camels and their

Egyptian drivers (209 men died of exposure), as both the men and the animals were entirely unused to such conditions.

From November 1st, 1917, to January 31st, 1918, there were 5,343 casualties in camels, representing 10·68 per cent. of the strength. Of these, 2,723 (5·44 per cent. of the force) were killed, died of wounds or exposure—this alone accounted for 2,090—or were missing, whilst the remainder, including 310 wounded, were transferred to camel hospitals. When the abnormal conditions under which transport camels worked are taken into account, there is no doubt that, as a whole, their resistance to heavy work and bad weather was better than was expected. This was due to the fact that they were well organized and had been well fed for a long time beforehand. Their indifference to shell fire was frequently commented on during these, as well as prior, operations.

The strain on the veterinary services was not confined to the front line; the hospitals on the lines of communication, although depleted of many of their staff who were called on to assist in the evacuation of sick animals and to fill gaps in the front line, did excellent work at high pressure. The arrival of No. 16 Veterinary Hospital from Cairo made it no longer necessary to maintain No. 2 Field Veterinary Detachment as a veterinary evacuating unit at Kantara; it was moved therefore to Moascar to function in that area as a small hospital for units, which now included the Australian Remount Depot transferred from Heliopolis. Extra local labour was authorised when the number of patients justified its employment.

On October 20th, December 29th, 1917, and January 31st, 1918, the distribution of veterinary units in the lines of communication and the number of animals under treatment were as follows:—

		<i>No. of patients</i>			<i>Remarks.</i>
		<i>Oct. 20th.</i>	<i>Dec. 29th.</i>	<i>Jan. 31st.</i>	
					1918.
No. 16 Vet. Hosp...	Kantara ..	1,576	1,014	2,024	
" 20 " " ..	Abassia ..	1,170	1,753	1,823	
" 21 " " ..	Bilbeis ..	916	1,600	1,722	
" 26 " " ..	Alexandria	685	1,335	1,840	
" 1 C.H.D. ..	Maadi ..	1,162	1,547	1,397	
" 1 F.V.D. ..	Rafa ..	167	532	470	Transferred to Belah on Nov. 13th.
" 2 F.V.D. ..	Moascar ..	122	126	238	
		<u>5,798</u>	<u>7,907</u>	<u>9,514</u>	
					<i>Camels.</i>
No. 1 Camel Hosp.	Zeitoun ..	1,302	1,257	1,446	
" 2 " " ..	Kantara ..	1,336	1,658	1,527	
" 3 " " ..	El Arish ..	1,039	1,553	1,220	Transferred to Belah on Dec. 3rd.
" 4 " " ..	Rafa ..	—	—	1,535	Formed at Kantara in Dec. and opened at Rafa in Jan., 1918.
		<u>3,677</u>	<u>4,468</u>	<u>5,728</u>	

Attention has already been drawn to the evacuation of as many animals as possible from veterinary hospitals prior to the commencement of operations, which enabled the Director of Remounts to keep field units up to strength. In addition, a weekly statement was prepared giving the number of class "A" animals likely to be discharged from veterinary units and returned to duty within fourteen days. Officers commanding veterinary hospitals were instructed to perform the operation of neurectomy on animals lame from ringbone and navicular disease, provided that they had good feet and were of a mature age, and the ventricle stripping operation on those suffering from roaring to such a degree as to render them useless. It was considered that these animals, when fit for duty, could be usefully employed on the lines of communication as class "B," and so liberate a corresponding number of class "A" animals for field units.

Separate records of these animals were not kept but the general results were successful. Most of the animals continued to work until the armistice when they were destroyed.

With a view to keeping control over horses and mules which were unable to stand the strain of work in the field and on the lines of communication, and which were not, economically, worth patching up for further duty, a system of branding on admission to hospitals was adopted as follows :—

<i>Admissions to hospitals in.</i>			<i>Branded on top near hind hoof.</i>
January and July	..	..	.. A
February and August	..	..	.. B
March and September	..	..	.. C
April and October	..	..	.. D
May and November	..	..	.. E
June and December	..	..	.. F

It took six months for the brand to reach the lower part of the hoof, and this enabled officers commanding veterinary units to see the original month of admission in the case of transfers from one hospital to another and to decide whether they had been fairly recent patients. This branding was also of considerable assistance in selecting those animals which had been under treatment for over two months for periodical inspection by the D.D.V.S., who decided whether further treatment was justified. On November 28th, No. 3 Camel Hospital was moved from El Arish to Dier el Belah and became the reception hospital for these animals.

The congestion in camel hospitals in December, and the prospect of a further influx of sick during the winter, necessitated the formation of another hospital, No. 4, which was mobilized at Kantara on December 21st, and was opened at Rafa on January 3rd, 1918.

In the original war establishment of a camel hospital provision was made for two staff-serjeants, but in practice it was found that the appointment of two equal ranks as senior N.C.Os. of these units

was not very satisfactory. Although the number of Europeans in the establishment was small (2 officers and 19 other ranks), there was a large number of Egyptians (5 officers and 463 other ranks), while the normal number of patients, 1,250, was frequently exceeded. It was considered that the substitution of a warrant officer for one of the staff-serjeants was advisable and would be an advantage as regards discipline and general control. The proposed change was approved by the general staff and forwarded to the War Office, who duly authorised the appointments being filled by the senior staff-serjeants already employed in the Camel Veterinary Service because of their knowledge of local conditions and language.

Camel purchasing operations were in progress in Egypt and the Sudan during this period. Camels were at that time very scarce in Egypt, and it was decided to purchase any up to the standard laid down suffering from camel pox, and to transfer them to hospital until they were fit for duty.

Major F. Fail and Major E. S. Oliver, A.V.C., were still actively employed in purchasing camels in the Sudan. The Director of Remounts realised their great responsibilities in this respect and that the excellent stamp of camels received from this source was in no small degree due to the efforts of these officers, and he applied for the temporary rank of Lieut.-Colonel to be given to them whilst so employed. This application although recommended was not approved. While employed on these duties Captain B. Jarvis, A.V.C., had been compelled to live under canvas for weeks together during the rains in malarial districts, as a result of which he contracted malignant malaria and had to be invalided to the United Kingdom. The Sirdar referred to this officer's indefatigable efforts to obtain camels, and wrote to the General Officer Commanding-in-Chief, Egyptian Expeditionary Force, on the highest terms of his ability and the work he had accomplished.

The decision to provide donkeys as well as camels for transport duty on the lines of communication in forward areas necessitated the purchase of 12,790 donkeys in Egypt between September 1st and December 31st, and the Director of Remounts again had to call upon the Ministry of the Interior for the services of their veterinary staff to purchase these animals (as well as camels). It is interesting to record that there were no positive reactions to the mallein test in this large number of donkeys. They were an excellent lot of animals, remarkably uniform in size, free from lameness and vice, and repeatedly proved their worth during the operations in the Judaeian hills.

Donkey transport companies were organized on the same lines as camel transport, i.e., 200 donkeys to a company consisting of five sections, the veterinary organization being one N.C.O., A.V.C., to each section, to which was issued one veterinary wallet and one unit veterinary chest (25 lb.). The sudden change from Egypt to the mountains of Judaea resulted in the deaths of 233 donkeys

from exposure, but as soon as the animals became acclimatised the losses on this account were infinitesimal.

The demand for N.C.Os., A.V.C., to complete establishments in new units and to replace casualties in the field, continued up to the end of the year and necessitated the intensive training of suitable men in veterinary hospitals. The provision of such men during this period was extremely difficult owing to the decision to transfer all class "A" men of the A.V.C. units employed on the lines of communication to combatant branches. In October the A.A.G. pressed for steps to be taken to carry out some of the man-power proposals, but as important operations were pending no further substitution could be effected at the time. It was pointed out that 75 per cent. of the European personnel of horse hospitals had already been replaced by Egyptians, that one European O.R. was employed to every twenty-two Egyptians in camel hospitals, and that it was difficult to make any further reductions. It was subsequently arranged for class "B" men to be attached to the veterinary service on probation and for no substitution to be effected until they had been trained. In the event of any expansion in the veterinary service in the near future, these men could be utilized and would obviate the necessity of asking for more men from home. The D.V.S. asked for 120 men, with a knowledge of horses if possible, and proposed to send twenty-five to each hospital and twenty to the convalescent horse depot. These men arrived in November, and by the end of December some of them had been sufficiently trained to enable forty-nine class "A" other ranks below the rank of serjeant to be transferred to combatant units. The man-power position at this time was very critical, and all directors of administrative services were interviewed by the Commander-in-Chief to ensure a thorough combing out of "A" men from the lines of communication. The D.V.S. again urged the necessity of fit men for mobile veterinary sections, and his proposal was accepted on the understanding that "B" men would be employed whenever obtainable. The position now was that 312 "A" men were to be released as soon as possible and that 265 "A" men were to be retained on the condition that "B" men would be substituted when possible. Three months elapsed before these substitutes were sufficiently trained to make it possible to release all class "A" A.V.C. personnel below the rank of serjeant in veterinary hospitals and the convalescent horse depots.

In addition to the above, thirty-two shoeing-smiths for the Australian mounted troops were trained in veterinary hospitals, and these were replaced by others for training in due course.

The King of the Hedjaz, to whom some hundreds of camels and mules had been sent for duty with his army, applied for a veterinary officer and a N.C.O., A.V.C., to be sent to Akaba. These were duly sent to him and a large quantity of veterinary stores was subsequently provided.

The shortage of forage in the country necessitated observations

being made on several unusual kinds of food in order to ensure that animals at the front should receive the best and most suitable available.

In April a quantity of dukhn, a species of millet extensively grown in western Sudan, was purchased and issued to No. 2 Camel Hospital at Kantara to test its suitability as a camel grain, but it was found to produce indigestion and had to be discarded. In June, deneba grass (*panicum crusgalli*), a poor species of millet grown on salt and alkaline lands on the fringe of the Delta, where it is used for feeding cattle and sheep, was found to be eaten by horses and mules in No. 26 Veterinary Hospital, Alexandria, both in the green and the dry state, and was obtained whenever possible.

In July the supply of gur for Bikanir camels began to run out, and the issue of sugar or additional sucrapaille as substitutes was considered. It was pointed out that there was no need for these camels to receive different rations from the others of the force, and that if they were gradually brought on to the change no evil results would follow; this proved to be the case.

In August 4 tons of sorghum, another species of millet grown extensively in Egypt and the Sudan, was issued to No. 1 Camel Hospital. Working camels were fed on 20, 50 and 100 per cent. of crushed and uncrushed sorghum for one month. A mixture of millet or gram with 20 per cent. of the crushed grain was eaten readily, and the camels were no worse for the experiment, but when the proportion of this crushed grain was increased the mixture was not eaten. As a result of these observations, limited quantities of crushed sorghum were purchased and issued to camel units.

In December large quantities of decorticated cotton cake were available in the country at a cheaper rate than grain. Two pounds of crushed cake were given daily to horses, mules and camels in veterinary hospitals. It was relished by the former, but many of the camels would not eat the full amount. After this the Director of Supply and Transport was recommended to issue it daily to all horses and mules in units on the lines of communication. Coarsely crushed locust beans were also used extensively for all animals during this period.

In December, owing to pressure of work, difficulty was experienced in the forward areas in watering all camels. This necessitated a routine order being published requesting formations having camel convoys or camels as first line transport to arrange for transport work to be done, as far as military exigencies permitted, at times that would enable camels to be watered during the middle of the day. This was necessary during the winter months as camels did not drink properly in the cold mornings and late afternoons.

During the summer months there were several accidents to Egyptian camel attendants, due to attacks made on them by camels in a state of "musth."* These animals were castrated in veterinary hospitals with excellent results. Most of the Somali camels were geldings and very easy to handle, and it is not understood why the

* "Musth" is a term used to describe the extraordinary change of mentality in the male camel caused by sexual excitement.

castration of camels is not performed more extensively in Egypt and the Sudan.

In October the issue of additional rugs was recommended for the camels that would be exposed to the trying conditions prevailing at the front. This extra issue was necessary because most of these animals came from countries where very little cold weather is experienced. There was some difficulty in meeting the demand for the number required, and the D.V.S. demonstrated the manner in which large horse rugs, of which there was a good supply, could be adapted to fit camels. In consequence, 40,000 rugs were altered and made available as a second covering by the end of the month, when the alteration of further supplies was undertaken for other animals of the force.

During this period the usual inspections of units were carried out by administrative veterinary officers, whose chief concern was the maintenance of condition in very difficult circumstances. Sore backs were causing a certain amount of inefficiency among the camels of the Imperial Camel Brigade. This incidence was attributed to faulty shaped side bars, the under sides of which had to be planed down. When more attention was also given to the stuffing of the panels and to correct girthing there was an appreciable reduction of casualties from this cause.

The embarkation veterinary staffs at Alexandria and Suez were kept fully occupied during the year, 3,410 animals being embarked for other theatres of war, while approximately 60,000 animals (horses, mules, donkeys and camels) were disembarked. Most of the disembarkations were animals received with the troops from Salonika, the remainder being mules from America, donkeys from Cyprus and camels from Algeria, India and the Sudan. Owing to the submarine menace some of the horse transports, after being loaded, were detained in Salonika harbour for eight days before sailing; this delay was the cause of a considerable amount of sickness among the animals when they disembarked at Alexandria.

An unusual amount of sickness from pneumonia, catarrh and wounds, on a horse transport en route to Mesopotamia in October, necessitated fifty animals being disembarked at Suez and sent to No. 16 Veterinary Hospital at Kantara. Most of the animals recovered, however, and in November were re-embarked for their original destination.

Of the animals received from America which had to be admitted to hospital on disembarkation the principal causes of sickness were ringworm, pneumonia, and glanders in the incubative stage.

The scarcity of shipping led to several vessels, which in ordinary circumstances would not have been accepted, being commissioned for transport work. H.M.T. "Ozarda" arrived at Kantara on December 12th from Berbera with 817 camels on board. The wooden tanks provided for watering the camels would not hold water and no buckets had been placed on board, with the result that 185 camels (22.6 per cent.) of the consignment had to be admitted

to No. 2 Camel Hospital at Kantara. The state of affairs was represented to the naval authorities by the D.Q.M.G. Subsequently, better supervision was exercised, and no further trouble was experienced in this respect.

Veterinary Stores.—In August, 40 tons of sulphur were received from Italy through the Army Service Corps, a supply which provided a good reserve for the making of mange dressing. In October there was a shortage of soda, the consumption of which was now about 3 tons monthly. Consequently, the proportion of this article, used in mange dressing, had to be reduced by 50 per cent. pending the arrival of further supplies from home. An effort was made to obtain locally horse fat for use in mange dressing, but the samples of crude fat supplied were so rancid and impure that they could not be utilized for veterinary purposes. During the autumn the increased demand for cotton wool from other countries led to the price being raised from 14 to 25 piastres a kilo, and even at this price there were only 1,000 kilos available in the country. Of fine tow, 2,000 kilos were obtained locally at 15 piastres a kilo, and all indents from the E.E.F. for wool were met by the issue of wool and tow in the proportion of seven-eighths fine tow to one-eighth wool. Of medium coarse tow, 3,000 kilos were obtained and used extensively to relieve the situation pending the receipt of consignments of wool from home.

Veterinary Statistics.

July to December, 1917.

The average animal strength during this period was :—

Horses, Mules and Donkeys	..	..	82,515
Camels	..	..	48,191

The wastage from all causes (died, missing and sold) was :

Horses, mules and donkeys 6,597, representing 7·99 per cent. of the average strength.

Camels 6,173, representing 12·80 per cent. of the average strength. Of these 2,738, representing 5·68 per cent., were cast and sold.

The total number of cases reported as having received veterinary treatment was 139,780, of which 66,620 were horses, mules and donkeys and 73,160 were camels ; 18,263 of the former, representing 22·13 per cent. of the force, and 13,629 of the latter, representing 28·28 of the force, were sent to hospital,

Causes of loss.

(1) *Horses and Mules.*—Strength 82,515.

(a) Wounds and injuries, 25,658 cases (31·07 per cent.)
Wastage 3,198 (3·87 per cent.).

This was the most serious cause of loss. 2,840 (3·44 per cent) were killed or destroyed in the field and 358 died in hospital.

(b) Digestive Diseases, 17,212 cases. Wastage 1,103 (1·33 per cent.).

Of the total 984 died in the field and 119 in hospital. The greater part of this mortality was again due to sand colic supervening on debility and exhaustion.

The extent to which this class of disease was affected by operations may be judged by comparison with the preceding six months, during which time the loss was 296, or at the rate of 0·4 per cent. of the strength. "Colic is a disease of work."

(c) General diseases, 10,552 cases.—Mortality 822, 1 per cent. of the strength.

This includes cases of debility and, as pointed out in a previous chapter, this class should be considered in conjunction with the previous one, owing to the bearing which debility, exhaustion and sand colic have on each other.

(d) Respiratory diseases, 2,107 cases. Mortality 354, 0·4 per cent. of strength.

(e) Lameness, 4,254 cases. Destructions 314, 0·38 per cent. of strength.

(f) Contagious diseases, 382 cases. Mortality 86, 0·14 per cent. of strength.

The major part of the loss in this class was from glanders, the detection and elimination of which demanded continual vigilance. Out of 88 cases, most of which were reactions to the mallein test, detected during 1917, forty-one were traced to remounts received from overseas, twenty-four occurred in horses and mules of the French contingent, seventeen from units in the field, and six captured Turkish animals. Prior to 1917, in view of information received that all oversea remounts had been tested with mallein prior to shipment, they were not tested on disembarkation. The frequency of the disease in American shipments therefore necessitated these animals being kept in isolation and tested with mallein before issue. In 1916, animals were tested only on admission to veterinary hospitals, but in February, 1917, instructions were issued for all animals to be retested before discharge to remount depots.

(g) Missing.—326 were reported under this heading.

Other causes of loss were negligible. Mange, piroplasmiasis, epizootic lymphangitis and anthrax occurred, but not in sufficient numbers to cause any serious trouble.

(2) *Camels*.—Strength 48,191.

(a) General diseases, 7,087 cases. Wastage 2,228, 4·62 per cent. of strength.

Debility was the general cause of most loss under this heading.

(b) Wounds and injuries, 23,013 cases. Wastage 2,079, 4·31 per cent. of the strength.

(c) Lameness, 1,599 cases. Wastage 723, 1·50 per cent. of the strength.

The large wastage from lameness was chiefly due to an ulcerative polyarthritis of obscure origin which only affected Somali camels.

Most joints of the body were attacked, the hip and stifle being the seats which gave rise to the most serious lesions, as with these joints affected the animals were unable to "barrak" or rise with their loads. The condition affected about 10 per cent. of the Somali camels with the force.

EGYPTIAN EXPEDITIONARY FORCE.

January to June, 1918.

The transfer of all the more important base depots from Egypt to Kantara in 1917 and the location of various lines of communication units east of Kantara necessitated important changes and developments in Kantara itself, whilst the increased strain on the railways entailed the doubling of the railway track across the Sinai Desert. The operations which began in October, 1917, resulted in the extension of the lines of communication to Beersheba to the east and to Mejdal to the north, followed by the inclusion of Ramleh (December 24th), Jaffa (December 30th), and Jerusalem (February 4th). Owing to the heavy floods during November and December the line was repeatedly breached for periods varying from three to ten days when the movements of supplies and animals came perforce to a standstill. The Turkish line was narrow gauge, rolling stock was scarce, and the Turks in their retreat had destroyed most of the bridges and part of the line. For these reasons very little use could be made of the railways for the evacuation of sick animals until January, 1918, by which time our standard gauge line had reached Deiran and we had repaired the Turkish narrow gauge line as far as Jerusalem. During the month of January and the early part of February the mounted divisions were all camped on deep sand among the coastal dunes through which the heaviest rains drained almost immediately, leaving the troops on clean dry standings. An ample supply of forage was available, but it took approximately six weeks to restore the condition of the mounted formations. The extremely emaciated animals which were evacuated to the veterinary hospitals and the convalescent depot took, on an average, three months to recover.

In January the forage situation at home was acute, and the War Office issued an order directing a reduction of 2 lb. of grain per animal per day. As all the animals at the front had been on very short rations, almost to the point of starvation, for the past three months, the observance of this order would have had disastrous results, and the D.V.S. represented that a reduction at this time should, if possible, be avoided. He also pointed out that if necessity compelled reduction it could be carried out during the summer with less harm than at present, but even then it would have a deleterious effect on the animals of the army as a whole and would impair their capacity for sustained exertion in the future.

Under peace conditions, if forage is not drawn by units an accumulation occurs in the forage running account which can be applied

to extra feeding at a future time at no expense to the State, but on active service any failure to draw the full ration is a dead loss to the animals. Statistics of the amount actually under-issued are not available. It would have been advantageous if some of the forage so saved had been subsequently issued to animals for a period corresponding with the number of days when they were unavoidably deprived of their full ration. This policy would have enabled the condition of animals to be restored with less delay, thus increasing mobility.

Fortunately the proposed general reduction in the forage ration was avoided, but every endeavour was made to relieve the situation by making trial of substitutes. Cotton cake was issued to animals in the forward areas, but as it was not easy to store this food in exposed depots the issue had to be discontinued. Owing to a shortage of tibben in Egypt the amount issued to all units on the lines of communication had to be restricted to enable animals in Palestine to receive 5 lb. a day. This article being packed in bales was easier to transport to the advanced areas and was considered of better feeding value than Indian hay, the quality of which had not improved. The position was now represented to the General Officer Commanding-in-Chief in India, who in reply, while recognising the justice of the remarks made, pointed out that the demand for fodder for overseas forces, apart from the ever increasing requirements of India, had been so large that India had been obliged to tap sources previously unexploited and that neither labour nor machines for cutting the grass at the right time were available. This indifferent fodder had consequently to be issued to all units, including veterinary units in the lines of communication; it contained a considerable amount of spear grass which caused frequent injuries to the mouth of animals eating it. Bean, helma and lentil tibben were purchased whenever possible and utilised as bulk forage.

The General Officer Commanding-in-Chief foresaw that when the force advanced the animals would be exposed to wet and cold in the Judæan Hills, where it would not be possible to provide transport for horse rugs. With a view to mitigating the bad effects of the climate in such places he gave instructions to the effect that horses, mules and donkeys should not be clipped. This was a wise precaution, but unfortunately there is an annual plague of lice during the winter in Palestine and Syria, and in spite of the careful inspection made prior to embarkation, mange had been found to exist in animals of units recently transferred to the E.E.F. Hence the D.V.S. had to represent that the clipping of some animals was necessary for veterinary reasons and that animals employed on the lines of communication, with no prospect of being transferred to the front, could be worked to better advantage when clipped. This concession, however, was not granted until February, by which time the existence of mange was well masked by the long winter coats and the disease in many cases was complicated by lousiness. In the meantime the number of clipping machines on charge of units in the field was insufficient to

deal with the animals that required clipping for veterinary reasons alone, so that these cases had to be evacuated to veterinary hospitals.

By the end of January, G.H.Q. had established itself at Bir Salem and our front had been thoroughly consolidated ; the troops had recovered from the hard fighting and cruel weather of December. The Commander-in-Chief now determined to extend his line to the Jordan in order to secure his right flank and to establish a base for the purpose of making raids on the Turkish lines of communication.

The 60th Division and two brigades of the Australian and New Zealand Mounted Division, which had concentrated at Bethlehem on February 18th, were employed in these operations. On February 19th an advance was made and, in spite of considerable opposition from the enemy on February 20th, Jericho was occupied by our troops on February 21st, after which the British line was established north of the Wadi el Auja from the Jordan to the mountains. The difficulties arising from the bad condition of the ground were as formidable as the opposition offered by the enemy. The descent from Jerusalem to the valley of the Jordan is very steep, for the beds of the main wadis run from west to east, and their banks are often so precipitous that any crossing from one bank to the other is impossible. Numerous tributaries join the main wadis from all directions, breaking up the ridges into a tumbled mass of hills. The fall of the ground to Talaat el Dumm is gradual, after which the main road pitches down in a series of zigzags and hairpin turns to the valley floor nearly 3,000 ft. below. Farther north, at Jebel Kuruntul, the mountains end abruptly in a stupendous cliff over 1,000 ft. high. The cavalry had to advance in single file along mere goat tracks where they suffered considerably from enemy fire. Afterwards they had to leave their horses in ravines and advance on foot. At one stage of the operations a battery of field artillery, unhampered by the enemy, took thirty-six hours to advance eight miles.

The right flank was now secure, but the base thus obtained was not sufficiently broad to permit of operations being carried out east of the Jordan against the Hedjaz railway. Between March 8th and 12th, therefore, further operations were carried out by the XXth and XXIst Army Corps which resulted in the capture of the high ground on the north bank of the Wadi Auja by the former, and in an advance to the north on either side of the Jerusalem-Nablus road by the latter, thus cutting off all tracks and roads leading to the lower Jordan valley. There was considerable opposition from the enemy in places and great natural difficulties had to be overcome, but the line thus established by these two corps remained almost the same until the general advance in September.

Conditions were now favourable for a raid on Amman, where the Turkish railway crosses a viaduct and passes through a tunnel. The object of the raid was to destroy both the viaduct and the tunnel or, failing this, to damage the railway as much as possible. The town of Amman lies some thirty miles to the north of Jericho, with which it is connected by an indifferently metalled road passing through

Es Salt. From the Jordan at El Ghoraniyeh, 1,200 ft. below the sea level, to Naaur, sixteen miles further east at the edge of the plateau on which Amman lies, the ground rises 4,300 ft. Nearly the whole of this rise occurs in the last ten miles before Naaur is reached, the intervening country being a maze of rocky hills intersected by deep ravines.

A special force was formed for this raid consisting of :—

The Australian and New Zealand Mounted Division.

60th Indian Division.

Imperial Camel Brigade.

10th Heavy Battery, R.G.A.

Light Armoured Car Brigade.

Army Bridging Train.

Desert Mounted Corps Bridging Train.

Operations commenced on March 21st and terminated on April 2nd. The Jordan was crossed on March 23rd, and the next day the 2nd Light Horse Brigade, of the Australian and New Zealand Mounted Division, and the I.C. Brigade started up the hills by the track to Naaur, but after going a short distance all wheeled transport had to be sent back owing to the nature of the country. The track, bad enough in fine weather, had become very slippery during the recent rains, and to make matters worse rain, accompanied by bitter cold winds, began again on the night of the 24th and continued during the whole of the next three days. Men led their horses and camels up the mountain side, the head of the column reaching the top by 2 a.m. on the 25th. It was now completely dark as the moon had set, and the whole force was stretched out in single file for about eight miles along the face of the mountains, up which the men continued to pull and push their shivering and exhausted animals. It took twenty-four hours to cover sixteen miles from the Jordan, and although the head of the column reached the summit by 2 a.m. it was not till 7.30 p.m. that the last camel arrived, the Camel Corps having marched dismounted the whole way. As soon as they were all up, the advance was continued by way of Naaur in pouring rain.

The New Zealand Brigade advancing via Es Sir had encountered similar difficulties of country and climate, and by the 26th both men and horses were in an exhausted condition : both columns had been marching and fighting over difficult mountain country and in most inclement weather. Consequently a day's rest was allowed. On March 27th a concentration of the two columns had been effected and a further advance was made, though this was considerably impeded by deep mud alternating with stretches of wet slippery rock on which neither horses nor camels could get secure foothold. Much valuable time was lost in finding a way over this very bad ground, on which many camels fell and broke their legs. Operations were continued in the vicinity of Amman up to March 30th, when it was apparent that greater artillery support was necessary and the whole force withdrew, reaching the Jordan on the evening of April 2nd.

From the commencement of the operations rain had continued to fall without abatement, and there was great difficulty in feeding the force. Forage and supplies were brought from Jericho by the divisional train, the horses of which were doing twenty-four miles a day. For the next part of the journey, from the foot of the mountains to the troops investing Amman, the forage and supplies were carried by the Camel Transport Corps, which suffered considerable casualties amongst the Egyptian drivers and the camels, from the severe cold and exposure. Owing to the fluctuation of the battle during the attack on Amman and the abnormal conditions, the camels often remained many hours under their loads, and most of their work had to be done at night. Convoys returning during the retreat from Amman had to use the same tracks as other units, with the result that they were greatly harassed; moreover 50 per cent. of the camels were overloaded. Two thousand camels were used on convoy duties, and of these 100 were killed in action and ninety-two had to be destroyed on account of injuries received.

As the operations were of the nature of a raid no special veterinary arrangements were made, and the mobile veterinary sections on their return to the Jordan marched their sick to Jerusalem, where they were entrained to Ludd. On arrival at Ludd the animals were taken over by No. 1 Field Veterinary Detachment, which had been moved up from Dier El Belah on February 25th, the advanced posts at Gaza and Dier Sineid being closed down on February 27th.

The two bridges built by the British force over the Jordan were a perpetual menace to the Turks, who made a determined attack on them on April 11th; this attack ended in complete defeat. At the end of April the enemy had 8,000 troops at Shunet Nimrin, and the Commander-in-Chief decided to make a raid on this force with a view to capturing it or compelling it to retire under very difficult conditions. The 60th Division, the Anzac Mounted Division, the Australian Mounted Division, the Imperial Camel Brigade, the Imperial Service Cavalry and Imperial Service Infantry Brigade were employed in these operations, which commenced on April 30th and terminated on May 4th. The enemy was driven back beyond Es Salt, but counter attacked successfully after being reinforced. During our retreat many horses fell into deep gullies and gorges, and owing to a large number of animals being killed by bombs, eight guns, several light general service wagons and a brigade field ambulance had to be abandoned.

In March and April the military situation in France was critical, and the E.E.F. was again called upon to send every man and gun that could be spared. The Yeomanry Mounted Division, the 52nd and 74th Divisions, ten other British infantry battalions, five machine gun companies and five and a half siege batteries were withdrawn from the line and despatched to France. The infantry was replaced by the 3rd and 7th Indian Divisions from Mesopotamia and by partly trained regiments from India, while the Indian cavalry from France replaced the Yeomanry. All infantry divisions in the E.E.F., with

the exception of the 54th East Anglian Division, were than re-organized on the Indian scale. These changes took place between April and August, when it was only possible to act on the defensive, to carry out raids and minor operations, and to complete the training of the partly trained new arrivals.

Considerable mortality and sickness occurred amongst the horses of the Indian cavalry which had been brought from France in three horse transports. In all three instances the losses were attributed to overcrowding, which was protested against by the veterinary officers, supported by commanding officers, at the time of embarkation. The maximum capacity of the ships was approximately 720 animals, but from thirty to fifty extra had been placed on board each transport. Rough weather and danger from submarines prolonged the voyage, which lasted seventeen days, of which nine and a half were steaming days. There were no spare stalls and it was impossible to isolate sick animals, while the crowded state of the ships prevented the proper exercise of the healthy ones. Owing to these unfavourable conditions fifty-eight animals died or had to be destroyed during the voyage, and 159 cases, of which 118 were pneumonia, were admitted to hospital on landing.

The three mobile veterinary sections of the yeomanry mounted division did not accompany their brigades to France and were disbanded in Egypt. The mobile veterinary sections of the Indian cavalry brigades were incomplete in European personnel, and one officer, one serjeant, one corporal, six privates, one shoeing-smith, and four A.S.C. drivers (attached) were posted to them from the disbanded yeomanry brigade mobile veterinary sections.

Up to this time the Imperial Service Cavalry Brigade had not been used extensively in active operations and was therefore without a mobile veterinary section; but as it was now proposed to make more use of these troops, it was considered a favourable time to form such a section from the A.V.C. personnel that remained from the disbanded yeomanry mobile veterinary sections. This proposal was approved and authorised, the Indian personnel (one daffadar and ten sowars) being provided from reinforcements for the brigade.

Six Indian field veterinary sections for 250 cases each arrived with the Indian cavalry. The officers who had proceeded from India with these units in 1914 had been retained in France, and not one of those who were now in command could speak Hindustani. Of the six N.C.Os. Indian Subordinate Veterinary Department only two remained, temporary N.C.Os. A.V.C. taking the place of the other four. The sections also had no salutries, veterinary daffadars, trained line orderlies or saddlers, and the syces were labouring under a legitimate grievance in that they had been on service for four years with no home leave. During their service in France the European personnel was found to be inadequate, and authority to supplement it, whilst in that country, was obtained. The extra European personnel was retained in France, and a similar

proposal for additional personnel to be attached whilst in Egypt was submitted to the War Office. It was proposed to form an Indian veterinary hospital for 1,250 cases at Bilbeis with five of the sections and to utilize the sixth as a veterinary evacuating unit at Ludd. These proposals were ultimately authorised.

In February the number of sick animals in veterinary hospitals was much in excess of that laid down in war establishments, and authority was requested to form and locate an additional hospital (No. 31) at Dier el Belah. This was duly granted, and by the end of the month this unit was functioning and had admitted 1,316 patients. The formation of this hospital enabled the veterinary posts at Gaza and Dir Sineid to be withdrawn and No. 1 Field Veterinary Detachment to be transferred to Ludd. On April 30th No. 23 Indian Field Veterinary Section was brought up from Egypt in relief of No. 1 Field Veterinary Detachment, which was transferred to Jerusalem.

The question of the occupation of the Jordan valley was now considered. Local authorities stated that it was impossible for Europeans to live there after May 1st on account of the prevalence of malaria of a violent type; even the Arabs evacuate Jericho during the summer months, the only inhabitants remaining being a hybrid race descended from African slaves imported in former times. The official military handbook of Palestine confirmed the local opinion to the following effect:—"Nothing is known of the climate in summer time since no civilised human being has yet been found to spend summer there." In addition to the danger of illness to men, the liability of infection to the animals from surra had to be considered, as it was known through the intelligence reports that the Turkish Camel Transport in 1917 had suffered heavy losses from this disease. Accounts differed as to the exact number; they varied from 14,000 to 42,000, the largest number being given by a veterinary surgeon who had been in charge of the Jerusalem-Jericho district in peace. He was quite definite as to the number, and stated that the loss was spread over three years. Captain Siamy Bey of the Turkish General Staff (son of Mustapha Pasha) estimated the losses from surra on this front, from 1915 to 1917, to be 23,000. He stated that the Turkish veterinary officers had very little knowledge of camels and that they were fed on anything that happened to be convenient. The exact number of deaths from surra will never be known, but it was evident that the mortality had been extremely heavy.

The Jordan valley is well provided with a good supply of spring water, and there was no difficulty in transporting forage there from Jerusalem after the main road had been repaired. In the spring of the year the land supports a little thin grass, but the fierce sun of early summer scorches it to brittle dust in a few days. The surface of the valley is covered with a layer of white marl impregnated with salt, several feet deep, which was soon broken up by the movement of mounted troops into a fine white powder resembling flour.

During the summer the nights are breathless, but in the early morning a strong hot wind, blowing from the north, sweeps this white dust down the valley in dense choking clouds. About 11 a.m. the wind dies down, and a period of deathlike stillness follows, accompanied by intense heat. Shortly afterwards a wind sometimes arises from the south, or violent air currents sweep the valley, carrying "dust devils" to an immense height; these continued till about 10 p.m. It was only after this hour that the men were able to obtain any sleep. The thermometer was found to register 109 and 113 degrees in the shade, and on occasions it rose as high as 122 degrees, while at Shorawyeh it registered 130 degrees. The tremendous evaporation of the Dead Sea keeps the atmosphere moist and adds to the discomfort caused by the intense heat, inducing a feeling of lassitude which is most depressing and difficult to overcome. In addition to these unpleasant conditions the valley swarms with snakes, scorpions, and mosquitoes, and men and animals were tormented by day and night by swarms of every sort of fly.

The Commander-in-Chief resolved to hold the valley line permanently, and the task of defending it was allotted to the Desert Mounted Corps. Throughout the summer two of the cavalry divisions remained in the valley, while the other two divisions rested on the cool heights of the Judæan Mountains or in the coastal plain near the sea.

As soon as the troops were settled in their camps in the valley, a vigorous campaign against mosquitoes was carried out by regimental parties under the direction of the medical authorities. This did much to reduce the incidence of diseases carried by mosquitoes, but the sick rate from this and other causes continued to be high and averaged 1 per cent. of the total strength a day.

Although the effect of the climate on the horses was not so marked as it was on the men, the animals did not thrive and they came out of the valley in poor condition. The principal reason for this was the insufficient number of men to water, feed and groom them; moreover, conditions were unfavourable for exercise, which is essential for keeping horses in good health and condition. By the time the daily sick had been evacuated and commanding officers had provided men for outposts and patrols and for anti-malarial measures, there was on an average one man to look after six or seven horses, and on occasions in some regiments there was only one man for every fifteen horses. Early in July the enemy, who had received considerable artillery reinforcements, commenced a systematic shelling of the troops, necessitating a frequent change of camp and horse lines, which had to be split up into sections in most inconvenient situations where horse supervision was almost impossible. The effect of these trying conditions on the health of men as well as animals can easily be imagined, but although the maintenance of so large a mounted force in the Jordan Valley was most expensive, it was considered less costly from every point of view

to hold the valley during the summer than to have to re-take it later on. Its retention undoubtedly played a most important part at a later stage in the strategy of the campaign.

The Australian and New Zealand mounted troops were relieved by the 4th and 5th Indian Cavalry Divisions in August. By this time the worst of the hot weather was over, and practically all anti-malarial measures had been completed, with the result that there was a full complement of personnel to look after the horses, which looked extremely well in September when they left the valley to take part in the great advance.

During March the D.V.S., the A.D.V.S., C.T.C., the A.D.V.S., XXth Army Corps, and Major Austin, the entomologist to the E.E.F., visited the Jordan Valley independently and searched for biting flies, with negative results; whereupon units concerned were informed that there would be no danger in grazing animals for the present, provided that they were not allowed to approach within one mile of the river bank. Veterinary officers were instructed to be on the look out for these insects and to report when any were seen.

In February, camel purchasing operations terminated in the Sudan, and Major F. Fail returned to the E.E.F. for duty, while Major E. S. Oliver was transferred to the Egyptain Army. At the same time, in connection with camel purchasing, the Sirdar placed on record his appreciation of the services of Major F. Fail, whose energy, organizing ability and frequent visits to trying centres had been of material assistance.

Approximately 15,000 riding and baggage camels were purchased in the Sudan, and although the procedure of appointing an A.V.C. officer to control the organization of the details connected with their purchase, collection and transportation was an innovation, the result was most successful. The extensive employment of officers A.V.C. and the veterinary surgeons of the Ministry of the Interior of Egypt as purchasing officers contributed largely to the result that there were so few unsuitable and unfit camels during the formation of the various camel units. It was fortunate for the E.E.F. that officers of such practical experience could be spared for the Sudan from the A.V.C. when others were not available.

In June it was decided to reorganize the Imperial Camel Brigade on a horse basis, and as this became a purely Australian and New Zealand formation, it was decided to recruit the mobile veterinary section for the new brigade from Australian and New Zealand personnel. The mobile veterinary section of the Camel Brigade was then disbanded at No. 2 Camel Hospital at Kantara. The serviceable camels of the brigade were transferred to the Transport Camel Corps and the unserviceable were sent to veterinary hospitals for treatment prior to disposal. One battalion could not be disbanded at the time as it had been sent to Akaba to assist the Hedjaz forces. It returned in September, having completed a 920 mile march in forty-one days, during which period the camels watered twelve times. Thirty-one

camels (3·47 per cent.) died during the journey and there were sixty unfit ones (6·74 per cent.) for evacuation to hospital. This was one of the finest marches made by a camel unit during the campaign.

Officers of the A.A.V.C. and the N.Z.A.V.C. on duty with their respective formations in the Desert Mounted Corps during their periods of short leave to Egypt had paid frequent visits to the various veterinary hospitals and the convalescent horse depots to try to learn something of their organization and working. These very short visits made them realise that there was much to be learnt, and with their characteristic enthusiasm and keenness to absorb knowledge several of them submitted official applications to be attached to these units for one month when active military operations were not in progress. Arrangements were made subsequently for one officer at a time to be sent when they could be spared.

It will have been realised that the duties and responsibilities of N.C.Os., A.V.C., serving with the depot sections of camel and donkey transport companies were far more onerous than in the duty sections, and that those appointed to the former had to show marked ability. In the interests of efficiency, therefore, it was recommended that one staff-serjeant should be substituted for one of the five serjeants in each camel or donkey transport company. This recommendation was duly approved and produced commendable competition throughout the subordinate veterinary personnel, while at the same time the measure indirectly improved the animal efficiency of these services.

Officers commanding veterinary units were kept fully engaged during this period in training class "B" personnel in general and special duties to replace class "A" men selected for combatant units. On March 3rd, 104 class "B" A.V.C. other ranks arrived from the United Kingdom and were distributed amongst the various veterinary units on the lines of communication.

The laudable desire of the Australian Forces in Egypt to be self-contained as far as possible led them, in March, to open a small school of farriery with a capacity for thirty candidates at their base depot at Moascar. This enabled veterinary hospitals to devote more time to training shoeing-smiths for the A.V.C., and for other units in the E.E.F.

In January, ten recent Egyptian graduates from the Veterinary College in Cairo were engaged for duty with the Camel Transport Corps, and this enabled five Egyptian graduates with war experience to be freed to take up government appointments in the Sudan. Reports were received afterward to the effect that their practical knowledge was of a higher standard than in pre-war days.

Owing to the high mortality from exposure amongst Egyptian syces in the forward area during the winter months, an issue of body belts and puttees was made to those employed in all duties, including veterinary, east of Kantara. Deaths and sickness from cold in veterinary units had been of frequent occurrence, and this

precaution for the coming winter did much to add to the comfort and efficiency of the camel syces.

Temurgies* were in great demand throughout the force, and a good supply of suitable men was trained and held in readiness to fill vacancies caused by sickness and by the expiry of engagements. The Hedjaz force realized the importance and usefulness of these men and applied for eight more to be sent to Akaba for distribution amongst their camel units.

When it was decided to purchase large numbers of donkeys to supplement camel transport in the hills, it was not possible to obtain shoes from England in time to shoe them before despatch to the front. The Director of Ordnance Services accordingly arranged for shoes to be made by civilian farriers in Egypt. These shoes were of the local pattern in use throughout the country, and each donkey was shod up before leaving Cairo and was equipped with a spare set of shoes and nails. Although the shoes were quite suitable for Egypt they were unsuited for work on the rough Judaeen Hills, and shoes of a horseshoe type had to be used.

A large number of Egyptian donkeys suffer from recurrent conjunctivitis, which is aggravated by sand and flies, and it was found necessary, in order to mitigate these evil effects, to issue eye fringes at the rate of 20 per cent. to each donkey transport company.

Between January and June, 3,959 horses and mules were embarked at Alexandria for other theatres of war, and a total of 42,385 horses, mules, donkeys and camels, 1,997 sheep and 4,236 goats were disembarked at Alexandria, Suez and Kantara. The sheep and goats were received from the Sudan for issue as meat rations to the Indian troops. A mild form of sheep pox was prevalent in some of the consignments received, but it was easily kept under control by prompt slaughter, isolation, and disinfection.

During 1917, the economical disposal of hides and carcasses of army horses and mules that died or were destroyed in veterinary hospitals in France was well organized and had effected substantial financial savings. In January, 1918, the General Officer Commanding-in-Chief, E.E.F., was asked to report what had been accomplished in this respect in Egypt. This matter had been fully considered in all its aspects in March, 1917, when it was decided that the collecting, salting, and transportation of hides would be impracticable and that the establishment of a factory for dealing with this service was not warranted.

The bulk of the animals of the force was now nearly 200 miles from the Suez Canal base, and the distances from the troops to railhead were considerable, whilst the wet weather, the difficulties of transport, and the conditions under which the troops were being employed made it more impracticable than ever to effect any salvage on the field. On the lines of communication about 200 carcasses a month were being disposed of at nominal prices

* Egyptian veterinary dressers.

to the Egyptian Manure Company in Cairo and to a tanning company in Alexandria, the hides reaching the trade through the ordinary commercial channels. That the price per carcass was small was due to the fact that the companies concerned had to make their own arrangements for collection and transport to their respective places of business. Tonnage from Egypt to Europe was also by this time very restricted, and intimation had been received to the effect that the despatch of ordnance salvage stores, including leather, would have to be discontinued at an early date. It was not possible to obtain the necessary plant for horse carcass economiser factories in Egypt, and in April it was decided to send out the plant from England, when an inspector of the Quarter-Master-General's services was sent out to superintend the construction of factories at Bilbeis, Kantara, Rafa and Belah, where veterinary hospitals were situated.

With the advent of the fine weather in April and the improvement in transport facilities, mobile veterinary sections were instructed to salve hides whenever possible, and for this purpose they were issued with a butcher's flaying knife for skinning.

Veterinary Stores.—The use of Kantara as the main base for the E.E.F. necessitated the transfer from Alexandria of the base depot of veterinary stores. In January a suitable site was selected at Kantara, but the necessary buildings and accommodation were not completed until the end of April, when instructions were issued to advance depots and veterinary hospitals to draw one month's stock, including mange dressing and mallein, in advance to admit of continuous supplies during the move. On May 18th the move of the base depot from Alexandria was completed, and on June 1st the advanced base depots of veterinary stores at Kantara and Rafa were transferred to Jerusalem and Ludd respectively.

During this period there was a shortage of whale oil for making mange dressing, and the deficit was made good by utilising cotton seed oil and Indian cooking oil, the latter being obtained through the Director of Supplies.

At home there was difficulty in meeting demands for chloral hydrate balls and several other drugs, and the indents from Egypt, as well as from other theatres of war, had to be cut down. Officers were notified of these facts and instructed to exercise the strictest economy in the use of drugs and dressing.

In April a supply of subcutaneous mallein which had been in the country for ten months was found to be of uncertain diagnostic value, owing to its having been affected by the climate, and was returned to the United Kingdom for examination. At the same time instructions were issued to the effect that in future intradermal mallein only was to be used for all testing. In 1917, under recommendation from the War Office, eusol was used extensively in the treatment of wounds, and large quantities were obtained from England for this purpose, but this article deteriorated to such an extent in Egypt that its use had to be discontinued. The boric acid remained in good condition, but the calcium chloride destroyed

the paper wrapping and rusted the tin containers extensively, forming eventually a sticky mass, with the result that hypochlorous acid was no longer developed by the preparation.

The whole of the veterinary stores, medicines, instruments and dressings in the East African section of war were consigned to the Base Depot of Veterinary Stores at Kantara during this period.

January to June, 1918.

The average animal strength during this period was :—

Horses	59,625
Mules	43,375
Donkeys	10,847
Camels	42,881
Total	156,728

The wastage from all causes (dead, missing and sold) was :—
Horses, mules and donkeys, 7,049, representing 6·19 per cent. of the average strength. Camels, 8,474, representing 19·76 per cent. of the average strength.

The total number of cases reported as receiving veterinary treatment was 157,801, of which 82,977 were horses, mules and donkeys, and 74,824 were camels. 24,760 of the former (21·74 per cent. of the strength) and 13,535 of the latter (31·56 per cent. of the strength) were sent to veterinary hospitals, and the remainder were treated with their units.

Compared with the previous six months (July to December, 1917) the losses in horses, mules and donkeys dropped 3·62 per cent., but the number of animals on the sick list rose from 8,000 to 12,000, the majority of which had taken part in the operations of the winter and early spring.

Camel losses were serious, rising from 12·80 per cent. to 19·76 per cent., and were attributable to the bad climatic conditions and unsuitable localities in which they were called upon to work.

Remarks on Diseases.

Anthrax was the chief source of loss from contagious disease among animals at the front during this period, and was the cause of 64 deaths. The disease was more prevalent in horses and mules than in camels, of which only a few were affected. It was met with generally throughout the hills, the most serious outbreak being in the area occupied by the 75th Division during the months of March and April. On this occasion, 35 deaths were reported, and other animals which showed exactly similar symptoms recovered (*see page 260*).

Glanders. Thirteen cases were detected and destroyed.

Piroplasmosis occurred, not in very large numbers, but the resulting debility necessitated a long period of recuperation. The symptoms and severity of the cases were similar to those met with in India. Redwater of a fatal type was prevalent in the cattle of the country.

Epizootic Lymphangitis was detected in two instances only—the diagnosis being verified microscopically—and both animals were destroyed. A third case was discovered in a civilian pony in Jaffa, and this was also destroyed through the civil administration.

Respiratory Diseases showed the same percentage of losses as in the previous six months, viz., 0·86 per cent., and, allowing for the increase of animals, the number of cases maintained the same proportion.

Digestive Diseases. As compared with the previous half year there was a reduction of over 2,000 cases and of nearly 1 per cent. of loss—1·85 per cent. as against 2·66 per cent. previously.

Wounds and Injuries showed an increase of numbers, 34,179 cases as compared with 25,658, but the percentage of loss was only 5·2 per cent. as against 7·68 per cent.

General Diseases, of which “Debility” was the chief source of loss, increased considerably. There were 16,637 cases and a loss of 3·06 per cent., as against 10,552 cases and a loss of 2 per cent. during 1917.

Camel Diseases. A report (included in Chapter XXVI) by Major Rabagliati on the incidence of disease at No. 1 Camel Hospital, between February, 1916, and May, 1918, based on observations of some 30,000 cases, provides a reliable guide to the causes of our losses in these animals.

Causes of Loss.

Under this heading, details are given of the main causes of wastage and the percentage of loss on the average animal strength caused by each class of disease:—

- (1) *Horses, Mules and Donkeys.*—Average strength, 113,847.
 - (a) Wounds and injuries, 34,179 cases. Mortality 2,971 (2·6 per cent.); 2,195 were lost in the field and 776 died in hospital or were destroyed.
 - (b) General diseases, 16,637 cases. Mortality 1,743 (1·53 per cent.); 1,340 were lost in the field and 403 died in hospital or were destroyed.
 - (c) Digestive diseases, 15,053 cases. Mortality 1,068 (0·93 per cent.); 815 were lost in the field and 253 in hospitals.
 - (d) Respiratory diseases, 2,997 cases. Mortality 493 (0·43 per cent.); 239 were lost in the field and 254 in hospitals.
 - (e) Lameness, 4,121 cases. Destroyed 232 (0·20 per cent.); 38 in the field and 194 in hospitals.
 - (f) Contagious diseases, 1,586 cases. Mortality 163 (0·14 per cent.); 129 died or were destroyed in the field and 34 died or were destroyed in hospitals.
 - (g) Skin diseases, 6,197 cases. Destroyed 34.
- (2) *Camels.*—Average strength, 42,881.
 - (a) General diseases, 8,892 cases. Mortality 4,205 (9·8 per cent. of average strength); 2,276 were lost in the field and 1,929 in hospitals.

- (b) Wounds and injuries, 24,089 cases. Mortality 2,408 (5·6 per cent.); 744 fatalities occurred in the field and 1,664 in hospitals.
- (c) Contagious diseases, 5,537 cases. Mortality 690 (1·61 per cent.); 643 of these fatalities occurred in hospital.
- (d) Lameness, 2,727 cases. Destroyed 529 (1·23 per cent.); 412 of the total were hospital cases.
- (e) Respiratory diseases, 891 cases. Mortality 203 (0·47 per cent.); 165 deaths occurred in the field and 38 in hospitals.
- (f) Eye diseases, 438 cases. Destroyed or cast and sold 0·3 per cent.; 121 of these were hospital cases.
- (g) Skin diseases, 29,190 cases. Destroyed 128 (0·3 per cent.); 88 were hospital cases.
- (h) Digestive diseases, 710 cases. Mortality 115 (0·26 per cent.); 107 died in the field and 8 in hospitals.

EGYPTIAN EXPEDITIONARY FORCE.

July to December, 1918.

At the beginning of September the preparations for the last and final advance were nearing completion. The reorganised force now consisted of :—

		<i>D.A.D.V.S.</i>	
The Desert Mounted Corps, A.D.V.S., Lieut.-Colonel E. P. Argyle, D.S.O., A.V.C.	Australian and New Zealand Mounted Division.	Lieut.-Colonel J. Kendall, A.A.V.C.	
	Australian Mounted Division.	Major F. Murray Jones, A.A.V.C.	
	4th Cavalry Division (Indian).	Major H. J. Holness, D.S.O., A.V.C.	
	5th Cavalry Division (Indian).	Captain (temporary Major) V. A. Bartram, A.V.C., T.F.	
20th Army Corps, A.D.V.S., Captain (temporary Lieut.-Colonel) W. J. Dale, A.V.C.	10th Division	Captain (temporary Major) G. Lloyd, D.S.O., A.V.C., S.R.	
	53rd Division	Captain (temporary Major) S. J. Williams, D.S.O., A.V.C., T.F.	
	60th Division	Captain (temporary Major) G. E. Henson, A.V.C., T.F.	
	54th Division	Captain (temporary Major) A. C. Duncan, A.V.C., T.F.	
21st Army Corps, A.D.V.S., Major (temporary Lieut.-Colonel) F. Fail, A.V.C.	75th Division	Captain (temporary Major) H. E. Powell, D.S.O., A.V.C., T.F.	
	3rd (Indian) Division ..	Major P. V. Beatty, A.V.C.	
	7th (Indian) Division ..	Major A. Edgar, A.V.C.	

In addition to the above there were four unallotted infantry battalions of the French detachment. (Chef de Service Vétérinaire, Major M. Mennig.)

On September 9th the approximate ration strength of the force was :—

British	..	..	226,900	Horses	..	..	74,800
Indian	..	..	111,800	Mules	..	..	39,100
Egyptians	..	..	128,950	{ Camels	..	..	35,000
				{ Donkeys	..	..	11,000

With the exception of a small and scattered reserve the whole of the Turkish force was enclosed in a rectangle 45 miles in length and only 12 miles in depth, with El Afule, Beisan and Deraa as the vital points of its communications. The plan of campaign was to create a gap in the enemy's right flank, which the cavalry could break through and then march rapidly to El Afule and Beisan, and thus surround the enemy before he could make his escape. Deraa was thought to be beyond our reach, and was to be left to the mobile detachmer of the Hedjaz force.

The veterinary arrangements based on this plan were as follows :—

- (1) Personnel from veterinary units on the lines of communication and the Egyptian Labour Corps were held in readiness to form three veterinary posts, two being allotted to No. 23 Indian Field Veterinary Section at Ludd, and one to No. 1 Field Veterinary Detachment at Jerusalem.

- (2) The strength of these posts was :—

Officers	Serjts.	Cpls.	S.-Smiths	Ptes.	<i>Egyptians.</i>		<i>Total.</i>
1	1	2	1	8	2	50	65

Each post was to be capable of dealing with 200 to 300 animals, for which extra picketing gear, head collars, head ropes and two unit chests were provided.

Sixteen transport camels were allotted to No. 1 Field Veterinary Detachment, while any extra transport required later was to be obtained through the Palestine lines of communication.

- (3) Additional personnel, consisting of 1 officer, 1 serjeant, 1 corporal and 4 privates, were attached to No. 23 Indian Field Veterinary Section.
- (4) Prior to the advance, the forward area was reconnoitred by the D.V.S., and sites for the first posts, at Ras-el-Ain on the left flank, and Ain Sinia on the right flank, were selected and notified to the formations concerned.
- (5) In the event of a successful and rapid advance on the left flank, the location of M.V.Ss. of the mounted divisions in echelon was left to the discretion of the headquarters of the Desert Mounted Corps.
- (6) Arrangements were made with the Engineer-in-Chief to hold in readiness for erection the material for 30 paddocks, 10 per cent. of which was to be held at Ludd and the rest farther back. These paddocks were considered necessary for dealing with the rapid accumulation of sick animals during the operations.

- (7) In view of the severity of the winter weather in Palestine, stabling was provided before October 1st in the following units :—

	Stables for
No. 31 Veterinary Hospital, Belah	.. 800
No. 23 Indian Field Veterinary Section, Ludd .. .. .	.. 150
No. 1 Field Veterinary Detachment, Jerusalem.. .. .	.. 150

- (8) Increased paddock accommodation was provided for 500 animals in the following veterinary units on the lines of communication :—

No. 20 Veterinary Hospital, Cairo.
No. 21 Veterinary Hospital, Bilbeis.
No. 26 Veterinary Hospital, Alexandria.
Indian Veterinary Hospital, Bilbeis.

Extra accommodation to enable the C.H.D. to deal with a total of 2,000 animals was also provided.

- (9) Ordnance equipment for 2,000 animals was issued to each Veterinary Hospital and to the C.H.D.
- (10) Owing to the decision not to clip animals during the winter, mange dips were built in all hospitals so that mange and lice could be dealt with satisfactorily.
- (11) The construction of another C.H.D. at Mena Camp, where a water supply and stone mangers for 3,000 animals already existed, was approved. (This was found unnecessary, and work was suspended on September 30th.)
- (12) The number of animals under treatment in veterinary units on the L. of C. was reduced as far as possible by disposing of unserviceable animals, and by issuing as many as possible to remount depots, in order to make available the extra personnel required for the veterinary evacuating units at Ludd and Jerusalem.

In anticipation of a successful advance by the Desert Mounted Corps, the D.D.V.S. issued special instructions for the working of the M.V.Ss. as follows :—

- (1) Before operations commence each M.V.S. will furnish a collecting party to work under the orders of the brigade veterinary officer. This party will collect casualties from units and conduct them to the M.V.Ss. The strength and position of the party will depend upon the nature of the operations, and will be decided at the brigade headquarters.
- (2) The M.V.Ss. and transport will be kept in touch with the brigades by means of the collecting party. Their position will also be decided by the brigade commander, but it is suggested that they march and bivouac with their brigade transport. They will take over all casualties brought to them, and will be responsible for their accommodation until they have been handed over to the Field Veterinary Detachment, which will be arranged by Palestine L. of C.

- (3) Under certain circumstances it may be necessary to employ one or two M.V.Ss. under divisional or corps arrangements (e.g., placing them in echelon in case of a rapid advance in order to allow the patients an opportunity to rest). In such cases orders will be given direct by D.A.D.V.S. divisions.
- (4) Instructions as to routes to be taken by convoys of sick animals and supply depots where forage may be drawn will be issued later.
- (5) D.D.V.S. corps is to be notified as soon as possible by D.A.D.V.S. divisions of all changes in location of mobile veterinary sections, map squares to be given.
- (6) Attention is drawn to Veterinary Manual (War), 1915, Appendices 2 and 3.
- (7) Divisional arrangements are to be made for the handing over to Ordnance of articles of saddlery brought back with sick and wounded animals.
- (8) *Captured Animals*.—Attention is drawn to G.R.O. 3905 dated May 9th, 1918. In order that captured animals may not have to be marched with horse convoys, special arrangements for these animals are under consideration.
- (9) The full stock of halters is to be held by mobile veterinary sections.

At the commencement of the Beersheba operations in 1917, the condition of the horses of the Australian and the Anzac Mounted Divisions was extremely good on the whole, and they were able to overcome very great difficulties during the advance. But the occupation of the Jordan valley, the raids on Amman, the continuous hard work throughout the summer on a forage ration of reduced nutritive value, and the sickness amongst the men, made it impossible to give the animals an opportunity to regain that high standard of condition which is so necessary for severe and prolonged exertion in the field.

In July, reports were received from Egypt to the effect that the dries crop was 50 per cent. less than had been anticipated; the issue of this excellent forage had therefore to be reduced throughout the force by 2 or 3 lb., the exact amount depending on the size of the animals. To make up for this deficit an additional supply of Indian hay was considered, but in view of the inferior quality and feeding value of the hay already received it was decided to utilise tibben, of which there was a plentiful supply in the country. When dries formed 50 per cent. of the bulk forage the work value of the whole forage ration was 2738·56 foot-tons and would admit of a moderate day's work, but with a reduction of 3 lb. of dries the work value was reduced to 2178·4 foot-tons, sufficient only for a light day's work; in neither instance was it possible for an animal to accumulate any reserve of energy. The reduced feeding value of the ration, particularly for the mounted troops in view of past arduous work and the prospect of more to follow, was represented, and on August 27th the grain ration for the horses of the Desert Mounted Corps was increased by 2 lb.

Attention has already been called to the slow recovery of the horses of the artillery. Post-mortem examinations made on many of these animals revealed enlargement of the heart, which was attributed to the severe draught work in the heavy sand of the

Sinai desert, and to the strain of advancing at the same pace as the cavalry. There were several instances during the campaign where a detached brigade, in their eagerness to attack, advanced at such a rapid pace that the horse artillery were unable to keep up with and support them. It appears to have been overlooked that the artillery horse had to carry nearly the same weight as the cavalry, and had at the same time to assist in dragging a gun weighing a ton and a half.

The animals of "A" Battery of the South African Field Artillery, which had joined the force during the summer, were the best conditioned draught horses in the force. It was their custom to water once daily when not marching, and twice daily otherwise. When watered once daily they drank approximately $8\frac{1}{4}$ gallons, and when watered twice they drank $10\frac{1}{4}$ gallons. When the battery was not marching, exercise (about 10 miles) was given daily between 5 a.m. and 7 p.m. and two days a week with the teams in full marching order. Feeding was carried as follows:—

5 a.m.	..	..	..	Grain and tiben
7 a.m.	..	..	..	do. do.
11 a.m.	..	..	..	Tiben after water
2 p.m.	..	..	..	Hay
6 p.m.	..	..	..	Grain and tiben
7.50 p.m.	..	..	..	Hay

The A.D.V.S. of the XXIst Corps called the attention of his G.O.C. to the excellent results obtained from this system, which was afterwards adopted, the horses and mules being watered not more than twice daily and fed at least five times a day, with the result that they were found to be in better condition than when watered three times and fed four times daily.

In India, even on the frontier and in the hills, it is customary for most of the mules not to be shod, and the establishment of shoeing-smiths in transport companies (one to 250 mules) is based on this procedure. Before the commencement of the Beersheba operations, a routine order had been published to the effect that all animals of the force were to be shod all round. It was well known that the force would have to march over the rough sharp rocks in the Judæan hills, and that protection to the feet would be necessary. When the 3rd and 7th Indian Divisions arrived in Palestine their mules were unshod, and their G.Os.C. protested against this order. They pointed out that it was against their experience in India, and that their present establishment of shoeing-smiths (1 to 250 animals) would not be able to deal with the situation if this order were enforced. Their protest was duly considered, and it was decided that no exception to the shoeing of animals should be made for the Indian Division, and that extra shoeing-smiths were to be obtained from India. They were not, however, available from this source, and the veterinary service was again called upon to undertake the intensive training of Indian "nalbands." For this purpose a temporary school of farriery was established at the Indian Veterinary Hospital, Bilbeis,

to which 100 Indians were sent for three months' training, and when they had finished their places were taken by a similar number. The Os.C. Nos. 20, 21 and 26 Veterinary Hospitals were instructed to detail one farrier serjeant and one farrier corporal each for temporary duty at the School of Farriery, which was commanded by the O.C. the Indian Veterinary Hospital. Extra ordnance equipment, forges, tools, etc., were obtained from the A.O.D.

The syllabus of instruction was as follows :—

- (1) Structure of the foot.
- (2) Functions of the various parts.
- (3) Forge tools, their names and uses.
- (4) Removal of shoes.
- (5) Preparation of the foot.
- (6) Sizes and varieties of shoes used in the service.
- (7) Hot and cold fitting.
- (8) Nailing on and finishing off.
- (9) Improvised methods of altering shoes.
- (10) Common faults in shoeing.
- (11) First-aid treatment for simple diseases of the foot.
- (12) The duties of shoeing-smiths in camp and on the line of march.

The language difficulty was overcome by writing for the use of the instructors the names of the tools and of the various parts of the foot, and the terms used in shoeing, in phonetic Hindustani with their meaning in English. The school was a great success and created a most favourable impression on the Chief of the General Staff, India, at the time of his visit to Egypt.

The large increase of Indian troops in the force necessitated a reserve pool, as well as a full complement of Indian salutries and dressers. In July there was a shortage of both, and none was available in India. This difficulty was overcome by promoting the best dressers to acting salutries to complete establishments, while suitable men were selected and sent to the Indian Veterinary Hospital for a course of training in animal management and elementary veterinary duties to complete the vacancies so created.

In July, Captain H. E. Cross, Indian Army R. of O., Veterinary Branch, was sent out to the E.E.F. to be employed as a camel specialist. This officer had extensive experience of camels in India, and had written a book on the "Diseases of Camels." He was detailed to make a tour of the various veterinary hospitals and the camel units of the force, where he was very much impressed with what he saw of the general management, care and veterinary treatment of these animals. As his services were only available for six months, he was then detailed to undertake a systematic examination of all camels in the various field units of the force with a view to estimating the percentage of trypanosomiasis infection, and gauging the effect of the preventive measures taken when working in known fly areas. As a result of this examination, two per cent. of the total number of camels (excluding those in veterinary hospitals) were found to be

affected, while the simple preventive measures taken in the Jordan valley were found to have had a good effect. The observations of this officer are embodied in a special note on this disease. (See page 251).

The decision to utilise camel transport extensively throughout the winter in the mountainous parts of Palestine and Syria, combined with the restriction in the amount of equipment to be carried, necessitated some modification in the system of clipping. Hitherto camels had been clipped throughout the winter to enable mange to be kept under control, but it was now decided to clip and dress with mange dressing extensively up to October 1st, when camels were allowed to grow their coats as a protection against exposure in places to which they were totally unaccustomed. Four hundred extra clippers had to be employed during the months of August and September to complete the clipping before the active operations commenced.

Prior to the advance, a thorough inspection was made by the administrative veterinary officers of formations of all animals of the force : those which were in poor condition or unlikely from any cause to withstand the strain of strenuous operations were evacuated to veterinary hospitals. Unfortunately, the number of remounts for replacement was limited, and since the preparations for the campaign had been kept so secret, it was not possible to supply some of these to units before arrival at their points of concentration. A fortnight's steady work in the field would have benefited these animals considerably, but in the circumstances this was not possible. As in all previous campaigns, the animals that had most recently joined the force were the first to collapse in the advance.

The plan of campaign necessitated two cavalry divisions being transferred by night, at very short notice, from the Jordan valley to the area of concentration in the neighbourhood of Ramleh, Ludd and Jaffa, where clothing and equipment surplus to requirements were returned to the Ordnance Depot or left behind at brigade dumps. Each horse carried $21\frac{1}{2}$ lb. of grain, and in addition one day's grain ration for each horse was loaded on the "A" echelon limbered wagons. The attack on this part of the line was entrusted to the XXIst Corps which was strengthened by the addition of the 60th Division, the French Detachment, the 5th Australian Light Horse Brigade, two brigades of mountain artillery, and eighteen batteries of heavy and siege artillery.

The operations which followed were divided into five phases. The first phase was of 36 hours' duration, between 4.30 a.m. on September 19th and 5 p.m. on September 20th, when the enemy's line was broken near the coastal plain, enabling the cavalry to pass through and reach their positions at El Afule and Beisan, while the VIIth and VIIIth Turkish armies were driven back and forced to retreat into the trap laid for them.

In the second phase practically the whole of the VIIth and VIIIth armies were captured, Haifa and Acre were taken, while Tiberias and the country to the south and west of Galilee were occupied.

The IVth Turkish army east of the Jordan was attacked by Chaytor's force and compelled to retreat leaving Maan in our hands.

In the third phase the IVth army was attacked and pursued by Chaytor's force, the retreat of the garrison of Maan was intercepted, the garrison captured, and the town of Amman taken.

In the fourth phase the Desert Mounted Corps captured Damascus, while the XXIst Corps advanced through the coast to Haifa and Beirout. In the fifth phase the 5th Cavalry Division advanced to Aleppo and occupied that city on October 26th.

The principal factors contributing to animal wastage during these operations were as follows :—

The long marches.

The limited amount of forage available.

Sickness from malaria and influenza among the mounted troops.

Difficulty in evacuating sick animals.

In the first phase the 4th Cavalry Division marched 70 miles in 34 hours, the first 20 miles being over a roadless country with sandy soil, and fought two actions with a loss of 26 horses. Troops were on the move for three successive nights, and the march is probably a record as regards pace and distance covered. The 13th Brigade of the 5th Cavalry Division covered 50 miles in 22 hours, whilst the 3rd Australian Light Horse Brigade of the Australian Mounted Division on one occasion covered 11 miles in 70 minutes. In twelve days, September 19th to 30th inclusive, three cavalry divisions marched over 200 miles, fought a number of minor actions, and captured over 60,000 prisoners, 140 guns and 500 machine guns.

The long marches, made chiefly at night, on half rations for such a lengthy period caused a serious loss of condition among the horses, which were extremely jaded and in need of a rest. After September 25th, up to October 10th and 14th, when Beirout and Tripoli were occupied, the Desert Mounted Corps were dependent for forage on what they could find in the enemy's country. Fortunately, except on one or two occasions, water was plentiful.

During the advance, the Australian Mounted Division and the 4th Cavalry Division had to camp in malarial districts, and on October 5th, the day on which the advance on Damascus was resumed, malaria and influenza broke out in these divisions to such an extent that they were almost incapable of moving. This state of things greatly reduced the efficiency of the horses, which required a great deal of care and attention, particularly in the matter of forage. When the man power of a unit is at its maximum it is always possible to detail forage collecting parties to make up any deficiencies of supply, but these two divisions were unable to do anything in this respect. The 5th Cavalry Division had not been in mosquito districts, and was, therefore, able to advance on Aleppo when the other two were so weakened as to be almost out of action.

In spite of these misfortunes, our superiority over the enemy at this stage was so great that the Commander-in-Chief decided to push on with his cavalry at least as far as the Rayak-Beirout

line. The 4th and 5th Cavalry Divisions were detailed for this task, the Australian Division remaining near Damascus. On October 5th the advance commenced, but by October 10th malaria had laid such a hold upon the men of the 4th Division, that any further move by them was out of the question. The 5th Division by this time was also weak in man and horse power. The G.O.C., however, deemed himself strong enough to march to Aleppo, which was occupied on October 26th, but the horses were too exhausted to continue the advance further. In the thirty-eight days since the commencement of operations, the 5th Cavalry Division had marched 567 miles and had fought six actions, with a loss of only 21 per cent. of its horses.

The progress of the infantry, and the difficulties they had to encounter after a gap had been made for the cavalry to pass through, varied in the different sectors. On September 19th the 60th Division, after marching and fighting for 18 miles, mostly over heavy sand, carried Tul Keram before dark. The 3rd Lahore Division advanced into a waterless area beyond Kalkilieh, which necessitated a pipe line 7,000 yards in length being laid to Jiljulieh, where storage was arranged the same day for 70,000 gallons of water. On September 20th the 7th Division had to march all night through very difficult country, following mountain tracks over which no wheels could move and where a great shortage of water was experienced. A road had to be made to enable the artillery to advance, and the 10th Division drove the enemy back 7 miles over very difficult country where the artillery were unable to keep up with the infantry.

On September 21st Chaytor's force began to advance east of the Jordan on the IVth Turkish army whose position was now untenable owing to the defeat of the VIIth and VIIIth Turkish armies. On September 24th it was in full retreat on Es Salt and Amman, pursued by the Australian and New Zealand Mounted Divisions. Es Salt was taken on the 23rd and Amman on September 25th, 10,332 prisoners, 57 guns and 147 machine guns being captured in the course of the operations. During the advance on September 31st this force had to camp in the Jisr ed Damieh area, in which no attempt had been made to cope with the mosquito menace. On September 28th malaria began to break out, and within a week the 1st Light Horse Brigade had evacuated 126 cases, and by October 10th 239 cases. During the same period the New Zealand Mounted Brigade evacuated 316 cases, the S.V.O. to the Brigade (Major Stafford) being one of the victims. The 2nd Light Horse Brigade moved direct from the protected area into the hills and had only 57 cases. This loss of man power considerably affected the animal management of this force, for during the march men fell off their saddles in a state of high fever, temperatures of 105° and 106° F. being frequently recorded, many were delirious, and it was a common sight to see one man leading eight horses.

In spite of the warnings issued regarding the danger of utilising newly threshed barley, 15 deaths and 160 cases of serious illness

occurred in Chaytor's force from this cause. But in such a rapid advance it was almost impossible to avoid using this barley since there was no other forage.

The animal casualties in the early stages of these operations were not numerous. Mobile veterinary sections and field veterinary detachments at this time were mostly occupied in handling captured animals, which had to be malleined and inspected for contagious diseases before being handed over to remounts or evacuated to veterinary hospitals. Up to October 4th the number of captured animals totalled 3,761, of which 1,446 were ponies, 1,354 mules, 274 donkeys, 516 camels and 171 cattle. Of these, ponies (10 per cent.), 480 mules (35 per cent.), and 82 donkeys (22·9 per cent.) were found serviceable and were passed on to remount authorities. The camels were handed over to the C.T.C., while the cattle were handed over to the A.S.C. for disposal. The collection and control of captured animals in the early stages was difficult, while the avoidance of contact with some of those affected with contagious diseases was impossible. When the enemy receives such a terrific bombardment, followed up by devastating machine-gun fire and bombing from low flying aeroplanes, as happened in these operations, the situation becomes a pandemonium during which animals are abandoned and allowed to stampede in every direction. In the narrow gorge which leads from Tul Keram by Anebta to Nablus the scene of destruction among the enemy was frightful and will never be forgotten by those who witnessed it. Those who escaped death and wounds soon abandoned wagons, guns, rifles, lorries and animals and took to the hills, only to be captured later on. Much as our men would have liked to stop and aid the wounded men and destroy fatally injured animals, they were unable to do so owing to definite orders to reach their objectives at a given time, and this humane work had to be done by others who followed on close behind. When those animals which had escaped with their lives were captured many were wounded or suffering from glanders and mange, and nearly all of them were in such a wretched, emaciated condition as to be worthless for military purposes. Definite orders had been published regarding the evacuation of all captured stock by M.V.Ss. but, as will have been gathered from the above and from the fact that formations and units were scattered over a large expanse of country, this was practically impossible at the time. In such circumstances units and individuals invariably seek to retain the best of the captured animals and run the risk of being found out.

The following incidents will illustrate some of the difficulties with which the Veterinary Service had to contend. At Tul Keram, on September 21st and subsequent days, between 300 and 400 horses, mules, donkeys, oxen and camels were brought down by prisoners of war who were evacuated by motor lorries, and who left their animals near the watering place where they had to be collected. There was only one N.C.O., A.V.C., and four natives on the spot to look after these animals until arrangements had been made with the Muktar

of Tul Keram for local Arabs to be engaged to assist in their evacuation to Ras-el-Ain. Similar congestion occurred at El Lejjun, Kerbur and Beisan, where several animals had to be abandoned, while 200 were too weak and exhausted to travel and were shot by the veterinary officer of the 12th Cavalry Brigade. These complications and the necessity of M.V.Ss. taking care of the sick of their own brigades were represented to headquarters, and eventually the bulk of the captured animals from the Desert Mounted Corps were ridden and driven down by prisoners of war. Arrangements were made for a party consisting of one officer and 29 mounted men from the M.V.Ss. of the XX Corps to be sent up to clear the captured animals from Nazareth, Afule and Jenin. By October 19th, 4,900 captured animals had been received, over 200 cases of glanders being detected amongst them.

The veterinary arrangements for these operations were based on a rapid advance of the mounted troops as far as El Afule and Beisan and a limited advance of the infantry, after which it was considered there would be time to reorganise the system of evacuation of sick animals. On September 24th the D.D.V.S., Desert Mounted Corps found it necessary, owing to the advance of the mounted troops, to arrange with the A.D.V.S., XXIst Corps, who had two M.V.Ss. at Kilkalieh, to take over the sick from the cavalry M.V.Ss., two of which had been left behind *en échelon*, and to transfer them to the veterinary post at Ras-el-Ain.

The functions of M.V.Ss. and F.V.Ds. can be carried out satisfactorily only when the system of supply has been properly organised. In these operations there was no difficulty in evacuating the sick of infantry divisions, but the usual procedure for the supply of forage on the line of advance of the cavalry was not possible, and on September 25th, and for several days afterwards, no forage, except the little that was commandeered, was available for captured stock or sick animals in those M.V.Ss. which were out of touch with their own formations. On September 27th the supply route was changed to the Haifa, Semak and Damascus line, which completely prevented M.V.Ss. functioning directly or indirectly with the F.V.D. and its advance post at Ras-el-Ain. This necessitated instructions being issued to all M.V.Ss. of mounted formations to retain their sick until some arrangements could be made to meet this unusual situation.

On September 27th the 4th Cavalry Division had advanced via Deraa, and the 5th Cavalry Division and the Australian Mounted Division via Jisr Benat, to Damascus. On arrival at Damascus the M.V.Ss. of the 4th Cavalry Division functioned as a Veterinary Hospital, while those of the 5th Cavalry Division proceeded to Aleppo, leaving casualties at Zahle (Riak), Homs and Hama en route, which were collected by the M.V.Ss. marching *en échelon*. These eventually arrived at Aleppo, where they were re-inforced by local labour and formed into a Divisional Veterinary Hospital in the stables of the 2nd Caucasian Turkish Army. Over a hundred horses

not considered worth treating were destroyed, and arrangements were made with brigades to form grazing camps for weak and emaciated animals in the vicinity of running streams on the high ground around Aleppo. This considerably relieved the strain on the M.V.Ss., and most of the animals slowly regained their condition.

The Australian Mounted Division remained at Damascus, and on October 4th the 4th Cavalry Division, with its M.V.Ss., left for Rajak and Zahle, arriving there on October 13th and 15th. The M.V.Ss. of this division, the personnel of which by this time had been much depleted by malaria and influenza, were amalgamated at Zahle under one officer and functioned as a small hospital.

The 4th and 5th Cavalry Divisions were by this time too far advanced to make any arrangements for the evacuation of their sick animals, but by October 11th those of the Australian Mounted Division were evacuated via Nazareth in batches of 200, with the assistance of prisoners of war. The march was done in five stages, and halts were made at Sasa, Kuneitra, Jordan Bridge, and Tiberias. At Nazareth the animals were taken by M.V.Ss. of the rearward divisions and marched via Jenin, Messudieh, Tul Keram, Ras-el-Ain to No. 23 Indian Field Veterinary Sections at Ludd. The last convoy, consisting of 147 animals of the Australian Mounted Division with prisoners of war and an escort, left Damascus on November 11th and marched all the way to Ras-el-Ain.

On November 17th an attempt was made to embark sick animals at Tripoli, but as this entailed taking them out to sea in shallow lighters, when weather permitted, and slinging them on board, it had to be given up. Animals which were considered worth treatment were marched to Beirout where it was possible for them to walk on board from the pier, while the remainder were destroyed.

As soon as all sick and injured animals had been cleared from the Jerusalem-Jericho front, No. 1 Field Veterinary Detachment was transferred to Ludd to relieve No. 23 Indian Field Veterinary Section, which was in turn transferred to Beirout on December 20th, where it collected all the sick from this area, and transferred those worth extensive treatment by sea to No. 16 Veterinary Hospital, Kantara.

The D.D.V.S. of the Desert Mounted Corps, part of whose duty it was to co-ordinate the evacuation of sick animals, was left at Lejun on October 26th without a motor car and was unable to get in touch with his headquarters until December 9th, with the result that the veterinary service was at a considerable disadvantage during this period. This was brought to the notice of the authorities, and eventually a car was obtained, but in future wars it is of importance that provision should be made for administrative veterinary officers of all corps to have motor cars to ensure satisfactory working of the service.

Sickness amongst A.V.C. personnel during the operations was almost as serious as it was amongst combatant units. All mounted divisions were short of veterinary officers, and at one time the

Australian Mounted Division had five in hospital, including the D.A.D.V.S. and the officer who subsequently acted for him. The M.V.S. of the 10th Cavalry Brigade had no British personnel left at all.

The continuous work demanded from all animals of the army during the summer and autumn of 1918 was such as to keep veterinary hospitals full, and they were organised to deal with a further increase as a result of the operations, but this was not necessary owing to the armistice. It was then decided to destroy or dispose of all animals of the following classes: rider 12 years and over, draught horses 15 years and over, and animals likely to require over two months' treatment.

Veterinary Statistics, July to December, 1918.

The average animal strength during the period under review was:—

Horses	..	..	..	..	..	58,871
Mules	..	..	..	..	..	44,501
Donkeys	..	..	..	..	..	11,562
						<hr/>
						114,934
Camels	..	..	..	..	..	34,154
						<hr/>
Total	..	..	..	..	..	149,088

The wastage from all causes (dead, missing, and sold) was:—

Horses, Mules and Donkeys—12,289; representing 10·69 per cent. of the strength of these animals.

Camels—4,493; representing 13·15 per cent. of average strength.

The losses among horses, mules and donkeys rose considerably as compared with the previous six months, and this increase was borne chiefly by the horses. Altogether 9,816 (16·17 per cent.) horses, 1,965 (4·42 per cent.) mules, and 508 (4·39 per cent.) donkeys, were killed in action, died, were destroyed or lost, during the last six months of the year.

In view of the prominent part played by the cavalry in the latter stages of the campaign, their exact losses of horses is of interest. Of the total loss of 9,816 horses, 3,579 (3·25 per cent. of cavalry strength) occurred with cavalry units in the field. 792 (8·29 per cent.) occurred with divisions of all arms in the field. 4,926 (18·11 per cent. of cavalry strength) cavalry horses were evacuated to hospital, and 3,933 (30·25 per cent. of strength) from divisions of all arms.

The number of horses with the cavalry averaged nearly 27,000, and a loss of under 4,000 with the units; and some 5,000 (18 per cent.) serious cases sent to hospital, was a very small price for the result achieved, which incidentally included a rapid advance of some 400 miles. The low number of cavalry transfers to hospital was due to their inability to evacuate their sick animals.

*Contagious Diseases.**(a) Horses, Mules and Donkeys.*

Anthrax showed a considerable increase compared with the first six months of the year—129 deaths, as against 64. Of the total, 99 occurred after the advance in September, and the heaviest loss was incurred in the north of the occupied territory at Muslimie. Syria had a bad reputation for this disease, and the neighbourhood where this last outbreak occurred was reported to have had annual outbreaks for the past 50 years.

Epizootic Lymphangitis spreads slowly in spite of efforts to check it. Every endeavour was made to trace the source of each of the 34 cases which occurred, not always successfully, for it existed in Egypt and Palestine, and some cases were traced to importations from France and Mesopotamia. The difficulties of dealing with this disease during operations are so well known that they need not be recounted. All cases were slaughtered. With the constant movement of animals to and from units in the field, hurried transfers of whole units to remounts, which were perforce split up and re-issued immediately, and a permanent chance of infection in the country, the force was fortunate not to have experienced more trouble with the disease.

Glanders.—The number of cases detected was 284, of which 269 were animals captured from the Turks.

Piroplasmosis accounted for the bulk of other contagious diseases and, as it was prevalent in the country, a proportion had to be expected. The mortality would probably not have been heavy under peace conditions, but when work is imposed during the early stages of the disease it rapidly exhausts the animal, and though it may not actually succumb, it becomes a "debility" case and was often evacuated under this heading.

The whole loss during the past six months from contagious diseases was at the rate of 0·70 per cent. of the strength.

Digestive Diseases.—From January to June digestive diseases showed a reduction in the number of cases and percentage of loss. In this period, July to December, it rose again in both respects, nearly 5,000 in cases and 1 per cent. in loss. The majority of the cases occurred in the field, and there was always an increase during periods of strenuous work. In the case of this army it must also be remembered that many horses were full of sand, and this was always a serious factor.

Skin Diseases showed a notable diminution, and the Army was as free from this class of disease as would be expected in a large body of animals under present conditions.

Enzootic Paraplegia.—In August, 1918, 12 horses died of this disease at the Indian Veterinary Hospital, Bilbeis. In each case cylicostomes were found in the large intestines, but Major F. E. Mason isolated a small streptococcus from the cerebro-spinal fluid

which he considered to be identical with that associated with this disease in Austria and Hungary described in Hutyra and Marek's Special Pathology of Domesticated Animals. The affected animals were destroyed and no further cases occurred.

Destructions in Hospital.

The number of animals (horses, mules and donkeys) destroyed in hospital was much larger than previously (4,678 against 1,155 for the first six months of the year). This was due to the fact that many aged animals which were evacuated from units would have taken a very long time before they could again be made serviceable, and as the state of the campaign no longer necessitated the patching up and retention of every animal which could again be rendered temporarily efficient, a larger proportion was destroyed.

The losses in camels were just under 15 per cent. of the strength, which must be regarded as satisfactory.

(b) Camels.

As in former periods of the campaign the contagious diseases that caused the greatest mortality among camels were camel pox, filariasis, tuberculosis, latia and surra. The loss from these diseases during the period July to December, 1918 amounted to 2,894 cases, *i.e.*, 1 per cent. of the total strength.

Latia was of frequent occurrence and most troublesome to eradicate. An investigation into the causation gave no definite practical result and serum treatment was not successful. Careful surgery and wound dressing were found to be the best methods of treatment, combined with isolation of the infected.

Although mange was very prevalent only 100 camels are known to have died or to have been destroyed during the period solely on account of this disease.

Eye diseases, which were sometimes the result of filariasis but more often due to injury from loads, thorns, or blows, necessitated the destruction of 211 camels, *i.e.*, 0·44 per cent. of the strength.

It will be observed from the charts at the end of this chapter, that the wastage during the first six months of 1918 was considerably lower than during the last six months of the year. The increase of loss was solely attributable to the active nature of the operations and the exertions and hardships which these entailed, to which reference has already been made.

Although the losses of horses and mules have not been given separately, it will be understood that by far the largest proportion of the increased wastage was among the horses. At the beginning of October 15·83 per cent. of the horses and 4·58 per cent. of the mules of the force were under veterinary treatment in various degrees, but in drawing any conclusion from these percentages it should be borne in mind that over 20,000 of the horses belonged to

the Desert Mounted Corps and these were called upon to go farther and work harder than the rest. Moreover, the major part of the work entailed by the necessary reconnaissances previous to the main operations naturally fell to the lot of the horses.

Disposal of Carcasses.

In August the by-products factory at Kantara was erected and in good working order, but the plant was only capable of dealing with 110 carcasses monthly, whereas there was an average of 150 to be disposed of monthly. An average of two gallons of oil—of good quality and suitable for veterinary purposes—was obtained from each carcass. The total yield was not enough to affect future demands for whale oil appreciably, and the construction of factories at Bilbeis, Belah and Rafa was put in hand, but on account of more urgent services in connection with the operations they were never completed. A total of 7,000 gallons of oil was received by the end of February, 1919.

An average of 23 horses and mules a day were killed for feeding Egyptian personnel and prisoners of war, 4,000 carcasses being handed over to the R.A.S.C., and 13,000 hides (all animals) were salted and salvaged.

The average amount of meat obtained from horses in fair condition was as follows:—

A draught horse	..	..	..	..	600 lb.
A cavalry horse	..	..	..	..	430 „
A cob	..	..	..	..	360 „
An average sized mule	..	..	..	..	430 „
A small mule	..	..	..	..	260 „

The sale of cast camels continued throughout the year, some being sold to butchers and others handed over to the R.A.S.C. for native rations. The average yield and value of the flesh from camels worked out as follows:—

	£E
A large camel, 600 lb., at 4 piastres per lb. ..	27·250
An average sized camel, 450 lb., at 4 piastres per lb. ..	21·250
A small camel, 350 lb., at 4 piastres per lb. ..	17·250

Up to March 1st, 1919, upwards of £85,000 had been received from these sources and credited to the accounts of the units concerned.

ENZOOTIC DISEASES.

Many references are made in the foregoing sections of this chapter to the incidence and control of the principal contagious diseases. The following notes refer in more detail to the research work that was carried out in connection with some of these diseases.

Trypanosomiasis in Camels in Egypt and Palestine.

Trypanosomiasis in camels was well known in Egypt and Syria before the war under the name of "El-Debab." There would appear to be ample ground for presuming that the form as recognised under this name is not identical with Surra: Major F. E. Mason, F.R.C.V.S., the veterinary bacteriologist to the force, draws attention to this point in a report that he furnished in July, 1918.

Trypanosomiasis infection, either in the form of El-Debab or Surra, came seriously to the notice of the A.V.S. when the military situation led to the necessity for the formation of the Imperial Camel Corps and C.T.C. on a large scale.

In December, 1915, the A.D.V.S., C.T.C., was despatched to the western district to investigate the existence of the fly, and to collect information as to areas infected. It was found that practically all stations and halting places in or on the edge of the western desert, and all the oases (Khargo, Beharia, etc.), as well as the whole of Fayoum, were infected with tabanidae. On receipt of this information, instructions were issued through the D.Q.M.G., G.H.Q., that, except under urgent military necessity, no camels were to be moved from these areas to stations west of the Nile valley, where a considerable number of camels believed to be healthy were employed. Flies were also found in the Suez Canal zone, and, from information available, it was assumed that several parts of the Sinai peninsula must be looked upon as infected areas. The plain of Philistia, as far as the Judaeen Valley, and various parts of Palestine, were afterwards known to be infected areas through a discovery of an interesting report of a committee appointed by the German military commander of the Turkish Army to investigate the disease.

The disease was discovered in camels admitted to No. 2 Camel Hospital, Kantara, early in 1916.

In the known infected areas, tabanidae and stomaxys were the principal flies. Of the former, the following six varieties were identified:—

Tabanus ..	Taeniola.	Tabanus ..	Alexandrinus.
„ ..	Arenivagus.	„ ..	Ditaeniatus.
„ ..	Siccus.	„ ..	Cyprianus.

Susceptibility.—No particular breed of camels appeared to be immune, but the disease was only discovered in one horse during the whole of the operations.

Period of incubation.—Experiments made by Major F. E. Mason show the average period of incubation for horses and camels to be twelve days.

Preventive measures.—The attention of the General Staff was drawn to the danger to be expected from this disease, and instructions were issued to all concerned with a view to minimising the risk of infection. It was not anticipated that trouble would be experienced in Sinai owing to the scarcity of water and vegetation, but, as the

army advanced into the Jordan Valley, and in areas known to be more suitable for flies, considerable anxiety was felt.

Approximately 6,000 baggage camels were employed during the worst period of the year (from April to September) in what were known to be the worst localities, where the enemy sustained serious losses from trypanosomiasis infection. It is stated that during their advance on the canal, losses in camels alone were 45,000, for which trypanosomiasis was largely responsible.

With a view to reducing all reservoirs of infection to a minimum, the following examination of camels was carried out before the army advanced :—

- (a) The temperature of camels was taken between 5 a.m. and 7.30 a.m. for seven days in succession.
- (b) Blood smears were taken from camels showing a temperature of 100° F. or over.
- (c) Camels showing such abnormal temperatures were carefully numbered and kept together.
- (d) Camels which gave a negative result on first blood smear were kept under observation, and, if the high temperature remained, blood smears were taken on three subsequent occasions.
- (e) When daily examination was impossible, the temperature examination was carried out on resting days.
- (f) Evening temperatures were taken when it was impossible to take them in the morning; those showing 103° F. or over being looked upon as suspicious.
- (g) Camels found to have trypanosomes in their blood were branded with the letter "T" on the near side of the neck before evacuation to hospitals.
- (h) In taking smears, careful disinfection of the knife between each bleeding was invariably observed, to prevent the possibility of direct inoculation.

Before the advance into the Jordan Valley it was considered advisable to publish an annexure* to General Routine Orders calling attention to the danger of trypanosome infection, and advising the measures to be adopted during the occupation of infected areas.

The disease did not spread to the extent expected in the Jordan Valley or elsewhere, and this may be attributed to the careful supervision and thorough co-operation of the officers of the C.T.C. in assisting to carry out the recognised procedure in respect of prevention. The camels were camped five miles from the river and, with the exception of 200 camels of "M" company, none were working near the river.

It was observed that the invasion of camps by biting flies was subject to variation. On some occasions large numbers were present, while on others, under the same conditions, none could be seen. Similar variations were noticed on the banks of the river Jordan.

* See page 257.

The results of examination were as follows :—

Camel Transport Corps.

Company.	Strength.	Cases detected.	Percentage.	Remarks.
B	1,147	32	2.78	Located Jordan Valley 14 days April and 14 days May.
D	1,182	13	1.09	—
E	1,177	10	0.84	—
F	1,172	24	2.04	—
G	1,169	12	1.02	Located Jordan Valley 7 days in March, 1918.
K	1,172	8	0.68	—
L	1,182	35	2.96	Located Jordan Valley for a few days in May, 1918.
M	1,199	11	0.91	Located Jordan Valley June and July, 1918.
O	1,156	nil.	nil.	This company was not in advanced zone of operations.
P	1,153	81	7.02	Located Kharfa Oasis Egypt, in 1916 and 1917.
Q	1,160	11	0.94	—
S Detachment ..	150	6	4.00	—
T	1,172	38	3.24	Located Jordan Valley May and June, 1918.
No. 2 Depot ..	2,088	141	6.75	--
Total ..	16,279	422	2.59	—

* The above acted as a casualty clearing and re-fitting unit for all companies of the C.T.C. The average daily strength was 941, and the total issues to companies and evacuations to hospitals were 2,088.

Imperial Camel Corps.

Company.	Strength.	Cases detected.	Percentage.	Remarks.
10	177	3	1.69	Examined on return from a 900 miles march during which 7 per cent. died from all causes. Exact data not available.
7	167	1	0.59	
5	218	1	0.45	
Total ..	562	5	0.89	—

Bikanir Camel Corps.

Company.	Strength.	Cases detected.	Percentage.	Remarks.
—	218	5	2·29	These companies could not be examined for 3 days.

Totals.

Unit.	Strength.	Cases detected.	Percentage.	Remarks.
C.T.C.	16,279	422	2·59	—
I.C.C.	562	5	0·89	—
Bikanir C. Corps	218	5	2·59	—
Grand Total ..	17,059	432	2·53	—

A routine temperature test was carried out in April, 1920, with the following results :—

Unit.	Strength.	Camels with morning temp. over 99° F.	Cases detected.	Remarks
C.T.C.	1,532	77	1	—
I.C.C.	216	8	—	—
Grand Total ..	1,748	85	1	—

Symptoms.—In some instances, although trypanosomes were found in abundance in the blood, no external symptoms of disease were to be seen, though, as a general rule, the indications were those of progressive anæmia.

Infected animals rapidly died when subjected to severe work and shortage of good food, but, where work was not heavy and food was of good quality and of sufficient amount, the animals not only survived but in some instances actually improved in condition.

Briefly the symptoms were: fever, emaciation, pallor of and petechiæ on visible mucous membranes, and ultimately paralysis and death. Much of the blindness and possibly also pneumonia and other organic complications which were reported may have been the sequel of trypanosome infection. Work during the early stages of the disease, or while paroxysms of fever were present, had a serious effect on the condition of health generally, and the presence of mange, filariasis and other infections also aggravated the course of the disease.

Disposal of Infected Camels.—Owing to the scarcity of camel remounts, it was not practicable to destroy all those found to be infected with the disease. All definitely diagnosed animals were branded with a "T" on the near side of the neck, and were isolated pending transfer to a veterinary hospital. Those suffering from extreme debility, or from any other disease likely to render them unserviceable for a long period, were slaughtered as soon as possible. The remainder were grouped according to condition or fitness to resume work, and were subsequently drafted to non-fly areas for duty. This was possible owing to the length of the lines of communication and the necessity of splitting up sections of some companies into detachments for purely local work. Some of the survey companies, R.E., working away from other troops, were equipped with animals that were known to be infected, with most successful results. Although the sick rate in such units was higher than in "clean" units, it was found that when they were ultimately disbanded many of the animals were in excellent condition and showed no sign of ill-health.

Eventually all infected camels on duty with units in the field were handed over to veterinary hospitals and were slaughtered, the carcasses of animals otherwise fit being sold to local butchers for native consumption.

Reliability of temperature test.—Observations carried out by Major D. S. Rabagliati at No. 1 Camel Hospital tend to show that the temperature test has its limitations as a means of radical extermination of the disease.

No. 1 observation.—Fifty-seven camels in fair condition, in whose blood trypanosomes had been demonstrated during the preceding month, were selected. Temperatures were recorded at 6.30 a.m. and 4.30 p.m. for twenty-one days. The blood of those showing a temperature of 99° F. or over in the morning, or 103° F. or over in the evening, was examined with the following results:—

31 were positive during the first week.

11 were positive during the second week.

4 were positive during the third week.

11 were negative during the whole period.

Of these, thirty-nine were positive in the morning test and eighteen in the evening test.

Once the parasite was demonstrated the blood was not further examined, although temperatures were recorded throughout. The temperatures were very irregular throughout the test, no camels remaining below 99° F. morning and 103° evening during the whole period. That 20 per cent. in this group of infected cases should have escaped detection throughout a period of 21 days' careful examination bears out what was already known from the work of Pease and others in India, and confirms the difficulties which have to be overcome in dealing with these infections.

No. 2 observation.—Sixty camels in excellent condition, and to all outward appearance in perfect health, drafted from field units

and branded for trypanosomes, were similarly tested for six days. Fifty-five showed irregularity of temperature and five exhibited no rise at all. Trypanosomes were demonstrated in six instances, five in the morning and one in the evening test, and the blood of all camels was examined.

It was intended to prolong this observation, but this could not be done owing to urgent demands for these camels to complete infected working detachments up to establishment. The need for examination to be extended over a long period is here again made evident.

No. 3 observation.—The blood of fourteen camels apparently cured and in good condition, branded for trypanosomes, was examined daily for twenty-one days. Two camels only gave positive results. Rats were inoculated with $\frac{1}{2}$ c.c. of blood (citrated) from each of these fourteen camels. Eleven showed trypanosomes in their blood within fourteen days of inoculation, two remained negative (including one rat inoculated from a camel whose blood was positive at the time of inoculation), and one rat died from accidental causes two days after inoculation.

From these observations it would appear that :—

- (1) The rise in temperature is more constant in the morning than in the evening, but the latter cannot altogether be ignored in the preliminary testing of units.
- (2) Between the high temperature periods and the normal there is a phase of the disease in which irregularity of temperature is a constant symptom.
- (3) Although the temperature test is useful in eliminating cases in their active stage, it is unreliable in respect of animals apparently cured which may be classed as "carriers."

The following preventive measures were recommended for adoption when dealing with trypanosomes in Egypt, Palestine and Syria during active operations :—

- (i) The publication of an annexure to G.R.Os. giving a short résumé of the disease, the distribution of known fly areas, and the measures to be adopted during the occupation of such areas.
- (ii) The application of the temperature test over a period of one month, and subsequent blood examination of all suspicious cases among all camels in the force before the beginning of the fly season.
- (iii) The immediate isolation and transference of all infected animals to a veterinary hospital located in a non-fly area.
- (iv) The branding of all infected animals.
- (v) The immediate destruction of cases unlikely to recover within a specified period.
- (vi) Infected animals in good condition and in fair to good general health to be issued to units in non-fly areas.

The following notes were issued as an annexure to Routine Orders (see page 252).

On working animals in a "Surra" zone.

The disease "Surra" is reported to have caused a great mortality in the animals of the Turkish army when occupying Jericho. The reports as to these losses are well authenticated, and it may be considered beyond doubt that the disease exists in the Jordan valley.

In India the disease kills horses in six weeks or less, but camels and oxen are very resistant, though they ultimately succumb. Until we have actual experience here, it must be taken for granted that the type of disease in this country is practically the same as in India, and precautions must be taken accordingly as far as military exigencies allow.

When camels and oxen are once infected they are capable of transmitting the disease, though they may show no visible symptoms of it.

The disease is carried from animal to animal by means of biting flies: those large varieties which are popularly known as "clegs," "horse flies," or "camel flies." A native name for the fly is "debab," and they call the disease "el debab" in many localities.

These flies breed in damp, shady places, and infest the neighbourhood of streams, pools and moist land. If there are no animals in their neighbourhood they do not leave such places, but they attack animals which come near and will remain on them, biting and flying from one to the other, and so may be carried long distances and thus spread to other places. They bite in the day only. In very hot weather they are most active from sunrise till about 10 a.m., and from 3 to 4 p.m. till dark, in moderate weather they are active all day.

When it is necessary to work animals in a Surra zone:—

- (1) Camp as far from fly infested localities as possible and march through such places at night.
- (2) Prevent local animals coming near troops.
- (3) Instruct all attendants to look out for and kill horse and camel flies whenever found on the animals.
- (4) Have all drinking places and their surroundings kept free of vegetation. When troughs are employed, they should be sited as far as possible from the source of supply if there is vegetation around it which cannot be destroyed.
- (5) Arrange camel camps and horse camps as far from each other as possible.

Anthrax.

Military veterinary history contains few references to anthrax. The incidence of the disease during the war was largely limited to the E.E.F., and most of the information that is available is given in the following extracts from a report from the Director of Veterinary Services, E.E.F.

Up to the spring of 1918 the E.E.F., with the exception of a few isolated cases, was exceptionally free from anthrax. At this period the force had marched into Palestine, where conditions as regards water and food were considerably changed. During the march across the Sinai Desert, water was mostly obtained from wells, there was no grazing, and all food had to be transported by rail from Egypt. On leaving the desert at Rafa, water from streams, grazing and local forage became more and more plentiful. No information regarding the existence of anthrax was available at the time, and it is now known that the enemy did not keep accurate records in this respect. The

first outbreak of the disease occurred during March and April, 1918, amongst the animals of the 75th Division at El-Tireh in the neighbourhood of Ludd. Nine horses and twenty-six mules died in six weeks, the disease appearing in sixteen different units of the division. It was attributed to grazing, and when this was suspended and the usual procedure adopted as regards isolation of in-contacts, disinfection and burial of infected carcasses, the disease abated.

A further outbreak occurred in October, 1918, amongst the animals of the corps in the district of Nablus and Tul-Keram, and later on in January, 1919, amongst the animals of the 5th Cavalry Division at Aleppo. These outbreaks happened during the rapid advance into Syria, when local forage and grazing had to be taken advantage of in order to supplement the scanty ration available on that occasion. As soon as grazing was suspended the disease subsided, and the force was comparatively free from it until July, August and September, 1919, when the mortality reached its highest point. Most of these cases occurred in Syria, practically every station being affected. The number of deaths reported at each station was as follows:—

<i>Syria</i>				<i>Palestine</i>			
Aleppo	..	..	47	Derar	..	..	4
Homs ..	..	..	29	Aintab	..	..	3
Hama ..	..	..	21	Killis	..	..	2
Rayak..	..	..	9	Damascus	..	..	2
Beirut..	..	..	8	Jerusalem	..	..	1
Ain Sofar	..	..	7	Acre	..	..	1
Zahle ..	..	..	4				

Grazing is scarce at this period of the year, and the source of infection was, in all probability, local forage, which had to be used extensively, none other being available. Camping on infected ground in a country where ignorance of the true nature of the disease and a lack of application of sanitary measures prevail would also account for some of the cases.

During inspections the presence of soil in grain and tibben, and its relation to anthrax and other diseases, was repeatedly pointed out to the headquarters of formations. Hand cleaning and washing were practised with good results, while an effort to clean on a large scale was under consideration. However, the disease subsided, and the evacuation of Syria began before anything could be done in this direction.

The influence of infected soil on forage was most marked in Syrian sheep imported from Egypt for slaughter before the war. On arrival at Alexandria and Port Said the sheep were placed in quarantine, and although they were given clean forage and kept under good sanitary conditions, the disease often broke out long after the recognised period of incubation. Clipping and dipping the sheep soon after disembarkation is said to have reduced the mortality.

The number of sheep imported and the number of deaths from anthrax were as follows:—

		<i>Number of sheep imported from Syria by sea.</i>			<i>Number of deaths.</i>	<i>Percentage.</i>
1909	..	141,760			184	0·12
1910	..	222,118			281	0·12
1911	..	115,317			216	0·18
1912	..	144,934			387	0·26
1913	..	197,105			510	0·25
1914	..	122,466			196	0·16
1915	..	1			—	—
1916	..	—			—	—
1917	..	—			—	—
1918	..	—			—	—

During 1920, soon after units became located in Palestine, the disease practically disappeared. Sporadic cases in such a country are unavoidable, in spite of the care taken in the selection of camps and watering, and in the use of clean forage, but because strict precautions were taken in the disposal of carcasses and the usual preventive measures were observed, the disease was always under control. Sufficient proof of this statement is the exceedingly small number of deaths from anthrax in veterinary hospitals during the war. Some thousands of patients passed through these units with a record of one horse and two camels dying from the disease.

Symptoms.—The records as regards symptoms were as follows:—

<i>Symptoms.</i>					<i>Number of Cases. Percentage.</i>	
No record	..	..	..	..	151	29·7
Swellings of the throat, neck or breast	..			..	110	21·6
Acute fever and of very short duration	..			..	87	17·1
Symptoms of colic or enteritis	..	..		..	76	14·9
Swellings of the abdomen and sheath	..			..	72	14·1
High fever and distressed breathing	..	..		..	7	1·3
Sanguineous discharge from nostril	2	0·3
Sanguineous discharge from anus	1	0·1
Acute cerebral symptoms	1	0·1

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In several cases swellings of the neck and throat were accompanied by swellings of the abdomen or by abdominal pain. In all cases there was fever and general constitutional disturbance. The symptoms observed in camels were mostly of the acute type, viz., illness of very short duration associated with high fever. Swelling of the throat and neck was recorded in six cases out of twenty-seven.

Duration of the symptoms.—As a rule the disease was of very short duration, but in a considerable number of cases the symptoms lasted from three to forty-eight hours before death.

Recovery.—Four horses and twenty-five mules at El-Tireh recovered after exhibiting fever swellings of the neck and abdomen. The swellings attained their maximum size in two days, after which they gradually subsided and disappeared in from seven to ten days.

Spread of infection.—Reference has already been made to grazing, which is one of the most important factors in the spread of the disease, also to contamination of forage by infected soil. In connection with soil, the Eastern custom of threshing corn by walking cattle over it repeatedly is occasionally responsible for forage being infected.

To save the trouble of burying animals in Egypt, Palestine and Syria, a native custom prevails of throwing them into rivers and canals. The danger in connection with anthrax carcasses in this respect is obvious.

Other factors directly and indirectly concerned deserve attention in order that any preventive measures that may be adopted may be understood and appreciated at their relative value.

From repeated enquiries made in most districts in Palestine as well as Syria, it is known that quite a number of privately owned animals die from anthrax without reports being made to the local authorities, owing to ignorance of the nature of the disease. Consequently the necessary sanitary precautions are not observed, and the spread of the disease is not arrested.

Living agents such as vultures, jackals, dogs and blood-sucking insects feeding on such carcasses may transfer anthrax spores to clean land. Jackals in particular have a habit of frequenting the vicinity of camps during the night in search of food, and may be the worst offenders in this respect. It is now known that all the above named animals are capable of creating fresh foci of infection by their faeces after feeding on infected flesh, but the danger to army animals from this source would not be so great as to those of the civil population.

It is not known to what extent immune sheep and cattle may be responsible in a similar manner for fresh foci after feeding on infected pasture or forage. The faeces of in-contact animals under observation and those which have recovered from the disease are also possible factors to be considered. Low-lying damp areas are also known to be dangerous during the late spring when grazing becomes scarce; this is due to animals of the civil population dying in the vicinity, the grass being more abundant and lasting longer in such localities. It is known that there is a local seasonal influence affecting the incidence of anthrax. This coincides with the beginning of the rainy season and may be attributed to the luxurious grass which grows on ground where infected carcasses have been left unburied.

Prevention.—The procedure adopted was the publication of a G.R.O. calling attention to the prevalence of the disease, and an annexure giving details as to the procedure to be followed in all outbreaks :—

ANTHRAX.

1. *Notification.*—All sudden deaths amongst animals are to be reported at once to the veterinary officer in charge unit.

2. *Inspection*.—Whenever it is possible, all dead animals are to be inspected by a veterinary officer before disposal of the carcasses, which should be left unopened where lying, and protected from natives and dogs. Other animals will be removed from the vicinity of the carcass.

3. *Burial*.—If, owing to lack of fuel, incineration is impracticable, carcasses should have the natural orifices plugged with tow soaked in a strong disinfectant, the nosebag of the infected animal being used to cover up the mouth and nostrils after plugging, and should then be removed on an improvised sleigh made of corrugated iron, or whatever suitable material is available, to a place selected by the O.C. Sanitary Section, in consultation with the D.A.D.V.S. of the division. If the O.C. of the Sanitary Section cannot be consulted, the O.C. of the unit concerned will be responsible for the burying site. Any soil which may have become infected by discharges, excreta, etc., should be dug up and buried with the animal.

Carcasses are to be buried at least six feet deep, and a mound of earth two feet high built over them. If lime is available, the carcasses should be packed in it.

If possible, carcasses should be buried in lower lying ground than the lines, but not near streams, and the place where the carcass was lying after death should have straw burnt over it and the ground turned over afterwards. Whenever practicable, the sites should be fenced in and notice boards erected with "Anthrax" painted thereon.

4. *Skinning*.—No carcasses are to be skinned until further orders, unless certified by the veterinary officer to be free from suspicion.

5. *Precautions re men*.—Men with sores on their hands must not be detailed to take charge of sick animals. Those in charge of sick animals should wash their hands in creosol solution after each stable hour.

6. *Equipment*.—All blankets, nosebags, picketing gear and grooming kits of infected animals are to be burnt on the certificate of a veterinary officer. Saddlery, etc., will be disinfected three separate times at intervals of three days before being used again.

7. *Grazing*.—Grazing and feeding grass in the lines should be prohibited altogether during serious outbreaks. When grazing and grass cutting are permitted, the parties detailed should be under the supervision of an officer or senior N.C.O., who will be responsible for seeing that no animals are allowed to graze within 300 yards of running or standing water, that no grass is collected from such places, and also that the grazing is on high ground and not in the neighbourhood of villages.

8. *Lines, Change of*.—When an outbreak of anthrax occurs in any unit, the lines on which it occurs are to be moved to a fresh site (preferably higher ground), and isolated. Isolation should not be relaxed until ten days have elapsed since the last death.

9. *Forage dump*.—If forage is to be drawn by animal transport, it will be dumped at a distance of not less than twenty yards from the isolated unit.

When the use of local grain, hay or tibben is unavoidable, it should be cleaned as far as possible. A piece of old tarpaulin or canvas should be placed on the ground of all unit forage dumps to reduce the risk of contamination with the soil.

10. *Water*.—"In-contact" animals will water at separate watering troughs; if in a stream, at a lower place than other units.

11. *Notice boards*.—Notice boards with "Anthrax" painted on them will be erected in any lines where the disease occurs as a warning to troops following.

12. *Train movement*.—No movement by train of animals in isolation will take place, except under special permission from the headquarters of the formation concerned, until at least ten days have elapsed since the last death. If by road, animals under suspicion will travel last.

13. *Faeces*.—Animals on lines occasionally eat each other's droppings. If this be noticed, animals are to be tied at a sufficient distance from each

other to prevent this. The dung of all "in-contact" animals should be collected and burnt or buried on the spot.

14. *In-contacts*.—These include those in the immediate vicinity of the affected animal, but may have to be extended to all animals exposed to the original cause. The temperature of these animals should be taken morning and evening, and those showing any rise of temperature should be placed in isolation. There should be no work during isolation. Ten days after the occurrence of the last case, animals may be returned to their lines. Animals cured of the disease should not rejoin their units until one month after recovery.

Mortality.

The deaths in various formations from October, 1917, to 31st March, 1920, were as follows :—

Desert Mounted Corps	..	..	..	118
XXIst Army Corps	..	..	..	98
XXth Army Corps	..	..	..	54
North Force	..	..	..	188
Miscellaneous Units	..	..	..	26
				<hr/> 484 <hr/>

The yearly death rate was as follows :—

Year.	No. of deaths.	Percentage of animals in Palestine and Syria.	Value at £60 per head. £
1917	2	—	120
1918	180	0·17	10,800
1919	301	0·27	18,060
1920 (Jan. 1st to Mar. 31st) ..	21	0·01	1,260
			<hr/> £30,240 <hr/>

Vaccination.

It is extremely doubtful whether the inoculation of all army animals under field conditions would have reduced the mortality. From 1886 to 1900, 39,506 horses were vaccinated by Pasteur's method in Hungary under favourable conditions, with a loss of 0·10 per cent. In the Argentine during 1904 and 1905, 2,000 horses are reputed to have been inoculated by Sobernheim's method without a fatality, but more recent German statistics of this method are not so satisfactory. From the above it may be assumed that further experience with both methods is necessary before adopting vaccination for an army in the field.

Contagious Pneumonia in Sheep and Goats.

In July, 1918, an outbreak of contagious pneumonia occurred at Kantara in a herd of 11,000 sheep and goats used for feeding Indian troops. The former were received from the Sudan where the disease was prevalent, while the goats came from Cyprus. The symptoms

were cough, snuffing, breathing, muco-purulent discharge from the nostrils, high temperature (103° to 106° F.), accelerated respirations, moaning and exhaustion. Gastro-intestinal complications were also observed in some cases. At first 3 per cent. were dying daily, but when disinfection routine was carried out and new pens were erected for isolation of the affected, the disease was soon got under control.

Parasitic Disease of Sheep and Goats.

In December, 1918, a herd of 2,495 goats arrived at Alexandria from Cyprus and were reported to be dying at the rate of 20 per day, with symptoms of exhaustion, emaciation, straining and diarrhoea. Post-mortem examination revealed a chronic inflammation of all four stomachs due to the presence of large numbers of a minute worm, invisible to the naked eye, which was identified by Major F. E. Mason as the *Strongylus Ostertagi* (Railliet) known to produce fatal results in sheep and goats. Some of the sheep were also suffering from diarrhoea, whilst others suffered from parasitic bronchitis, due to the *Filaria Capillaris*. Ticks, lice, and warbles in abundance were found on their skins, and the larvæ of the oestris ovis was found in the nostrils of a great many of the animals. In order to cope with these diseases the following measures were adopted, with satisfactory results :—

- (1) Isolation pens were arranged for :—
 - (a) Those suffering from diarrhoea.
 - (b) Those suffering from symptoms of parasitic bronchitis.
- (2) All goats were classified and grouped in separate pens according to their condition.
- (3) Extremely emaciated goats in advanced stages of disease were destroyed and their carcasses incinerated.
- (4) Those slightly affected were slaughtered, the intestines, lungs, etc., being incinerated, and the carcasses inspected before being issued as meat.
- (5) Issue of the rest of the consignment for early slaughter.
- (6) All food was cleared out of the mangers and burnt, $2\frac{1}{2}$ hours after feeding time.
- (7) Water was changed twice daily.
- (8) Floors of pens were swept out twice daily, the sweepings being burnt, and disinfectants were extensively used on floors of pens.
- (9) Veterinary inspections of the remainder were made daily, when those animals showing signs of disease were isolated and slaughtered.
- (10) Telegraphic instructions were sent to the authorities in Cyprus to stop embarking goats with symptoms of diarrhoea, cough or debility.

Goats in Cyprus live almost exclusively on grazing and tree grazing, and are scattered over wide areas. The herding together of large numbers favoured the spread of the above disease, while

the change of food to barley and tibben, combined with the effects of the journey, lowered the vitality of the animals and so increased the mortality.

Tuberculosis of Cattle.

As a result of the operations in the early part of the year, the dairy herd, consisting of 189 cows, 29 heifers and 3 bulls, belonging to a German settlement at Wilhelma was taken over. Some of these animals were found to be clinically affected with tuberculosis and the whole herd was subjected to the tuberculin test with the following results :—

				<i>Tested.</i>	<i>Reactors.</i>
Cows	..	..	..	189	14
Heifers	..	..	..	29	4
Bulls	..	..	..	3	nil.

The reactors were slaughtered under the supervision of a veterinary officer and the healthy parts of those not suffering from generalised tuberculosis were utilised as food.

Later in the year rinderpest, piroplasmosis, and contagious abortion, broke out in this herd.

Equine Mange.

Both the psoroptic and sarcoptic variety of mange were observed during the campaign, but the number of cases was limited and at all times the disease was kept well under control. The principal sources were animals received from Europe and captured animals. There were more cases during 1918 than at any other period. In March of that year the following cases were discovered :—

<i>Formations.</i>		<i>Sarcoptic.</i>	<i>Psoroptic.</i>
XXth Army Corps	..	53	6
XXIst Army Corps	..	24	3
Desert Mounted Corps	..	33	—

During the winter, 1917–18, thirteen cases of sarcoptic mange were detected in horses landed at Alexandria.

The disease was treated by sulphur and oil dressings, or by calcium sulphide solution, but later in the campaign considerable success was obtained by Major W. S. Lornie, A.V.C., in the treatment of the disease by sulphur di-oxide and steam in improvised chambers made with sun-dried bricks. The same treatment was found to be most efficacious in animals affected with lice.

Mange in Camels.

The notes on mange that were issued to officers of all camel units in 1917 are reproduced in Appendix B V of this volume, pages 715 to 718.

From observations during the course of the campaign on the prevention and treatment of mange, the following points were brought to notice :—

- (1) The more ground space allotted to camel camps, to facilitate change of lines, the less was the danger of the disease spreading.

- (2) Infection in supply depots and watering places was frequent and difficult to control. A periodical supply of disinfectants for the rugs and equipment of each camel unit was essential to ensure continuous disinfection being carried out.
- (3) Camels in good health and condition showed no ill effects from the treatment and could continue working.
- (4) Thin and weak camels required rest after dressing. In very cold weather they required double rugging, and protection from the sun in very hot weather.
- (5) Mange was more easily cured on hard ground than on soft sand, as the latter absorbed the dressing.
- (6) The most difficult parts of the body to treat were the feet and muzzle. They soon became re-infected from the itchy parts of the body being scratched and bitten, while the dressing on the feet was absorbed by the ground unless special precautions were taken to stand the camel on firm ground. Mange was more prevalent from September to February owing to the disease being masked by the winter coats and to the difficulty of clipping animals at the right time on active service.
- (7) Ashing was difficult in the desert, and scraping, which is not so effective in removing the old dressing, had to be substituted.
- (8) The disease was much easier to cure in camel hospitals where facilities for washing existed.

Clipping.

The establishment of five clippers for each company of the C.T.C. and five for each camel hospital was insufficient to deal with the amount of clipping required. It was not considered advisable to revise the establishment, as it was found that the situation could be dealt with more satisfactorily by engaging camel clippers temporarily, and forming a pool from which squads of forty or more under a rais could be detailed to companies at convenient times and places to clip out all camels in a minimum of time, while camel hospitals were authorized to engage extra clippers as required, this depending on the time of year and the number under treatment. A squad of forty was found to be able to clip a section of 400 camels satisfactorily in four days. A shear-sharpener for each squad of clippers was required, and owing to the rapid wear of the scissors each clipper required three machines whilst three machines were under repair in reserve. To keep pace with the growth of the hair, early clipping during the month of August, followed by re-clipping every six weeks, gave the best results.

Mange Dressing.

Whale oil and sulphur dressing combined with carbonate of soda gave the most satisfactory results. 4 lb. for each camel was

allowed for dressing all over, and 2 lb. for each camel for "patch" dressing; it took ten minutes to apply the dressing thoroughly in the first case, and five minutes in the latter. The better an animal was clipped, the less mange dressing was required. If clipping and dressing were totally neglected for six weeks, the infection in a company became general, and most of the camels were unfit for duty for from two to three months. Calcium sulphide baths, Cooper's sheep dip, paraffin emulsion and stockholm tar were all tried, but were found to be unsatisfactory. The Egyptian delta camel withstood the ill effects of mange better than other breeds, probably because he had always been more or less infected.

Poly-Chondro-Arthritis of Somaliland camels. (See page 606.)

Heat Apoplexy.

Heat apoplexy in camels was first brought to notice during a khamsin on March 28th and 29th in 1917, when the temperature rose 25° F. On this occasion 335 camels with units in the field died of the disease. On April 20th, 1918, another heat wave of considerable intensity passed over the country. At this time a large number of debilitated camels on the strength of No. 4 Camel Hospital were being grazed near Rafa, and 111 died between 2 p.m. and 4.30 p.m., while at No. 3 Camel Hospital, Belah, 40 deaths occurred at the same time.

The symptoms observed were trembling, sudden prostration and collapse; death ensued in from ten minutes to one hour, only a small percentage recovering. On post-mortem examination the blood was found to be much darker than normally, and there was marked tympany before death with rapid decomposition afterwards. It was noted that in nearly every instance there was some gross pathological lesion in addition to the debility, and in many cases this largely accounted for the sudden collapse. Preventive measures consisted in placing sacking or a blanket soaked in cold water over the poll of camels observed to be suffering from the effects of heat during khamsins and on very hot days. As a detail of stable routine, unloaded saddles or rugs were kept on the back to protect the spine, while every advantage was taken of shade for those in poor condition. Camels were also taken off the lines and allowed to move about at leisure.

Coccidiosis.

On March 1st, 1917, there was an outbreak of this disease among some Sudanese sheep at the Supply Depot, Kantara, when 5 per cent. of the animals died. The symptoms were diarrhoea and emaciation, and death ensued as a rule. The measures taken to deal with the disease were as follows:—

- (1) The immediate destruction of all sheep in advanced stages of the disease and the incineration of their carcasses.
- (2) The transfer of healthy animals to clean pens.

- (3) The early slaughter of those mildly affected, the carcasses being utilised for food if otherwise healthy, and the burning of their offal.
- (4) The disinfection of infected pens by removal and incineration of all manure, followed by burning tibben over the ground.
- (5) The daily cleaning out of all pens with a thorough disinfection twice weekly as laid down in (4).
- (6) The provision in each pen of feeding and watering troughs raised from the ground.
- (7) Daily inspection of all sheep by a veterinary officer, with prompt segregation of the sick.
- (8) Healthy sheep were issued to units who wished to draw them alive, with a warning to keep them apart from any other sheep in their possession.

WORKING OF VETERINARY UNITS.

Mobile Veterinary Sections.

The system of obtaining sowars from the various regiments of an Indian Cavalry Brigade was not satisfactory because they invariably belonged to different castes. In such a small unit it would have been better for all native personnel to have been of one caste and recruited specially for the A.V.C.

Head collars and chains were found to be more serviceable than hemp head-stalls, which were eaten by the famished animals during evacuation. For the same reason, light wire rope in lengths of 100 yards and picket posts would have been more satisfactory than a hemp picketing rope. Sandbags were found necessary in addition to picketing pegs for use in deep sand. Two pack horses with saddlery and traces for six riding horses, to assist the M.V.S. transport vehicles when necessary, would have been invaluable in this campaign; also two cattle killers instead of one. A set of post-mortem instruments and a small saddlery repair outfit were recommended to be added to the equipment of these units; also two towels instead of one for each man.

Field Veterinary Detachments.

These units were formed to receive all cases from M.V.Ss., to arrange for their accommodation and transit to the receiving veterinary hospital, and to detain those animals unable to undertake the journey until they had recovered sufficient strength to do so. In rapid advances the rate of construction and repairs to railways was frequently outdistanced for a considerable period by the troops, and the F.V.Ds. had to be reinforced temporarily to enable them to establish advanced posts at convenient intervals to rest the exhausted animals and travel them by stages down to the railhead. Being lines of communication units, it was only possible to advance the posts as far as forage supply depots had been established.

Railway arrangements were facilitated a good deal by the establishment of F.V.Ds., as this made it possible to deal with complete train-loads of horses instead of odd truck-loads, which was a much more satisfactory arrangement to all concerned and enabled empty returning remount trains to be economically used.

At Moascar, Kantara and Rafa, sun shelters for 25 per cent. of the animals were found necessary, while at Ludd and Jerusalem, stabling made of sun-dried bricks and corrugated iron roofs had to be provided on account of the cold and wet weather of the winter in these localities. Inexpensive kraals, similar to those described on page 269 were found necessary to economize labour and enable these units to deal satisfactorily with sudden influxes of patients.

Veterinary Hospitals.

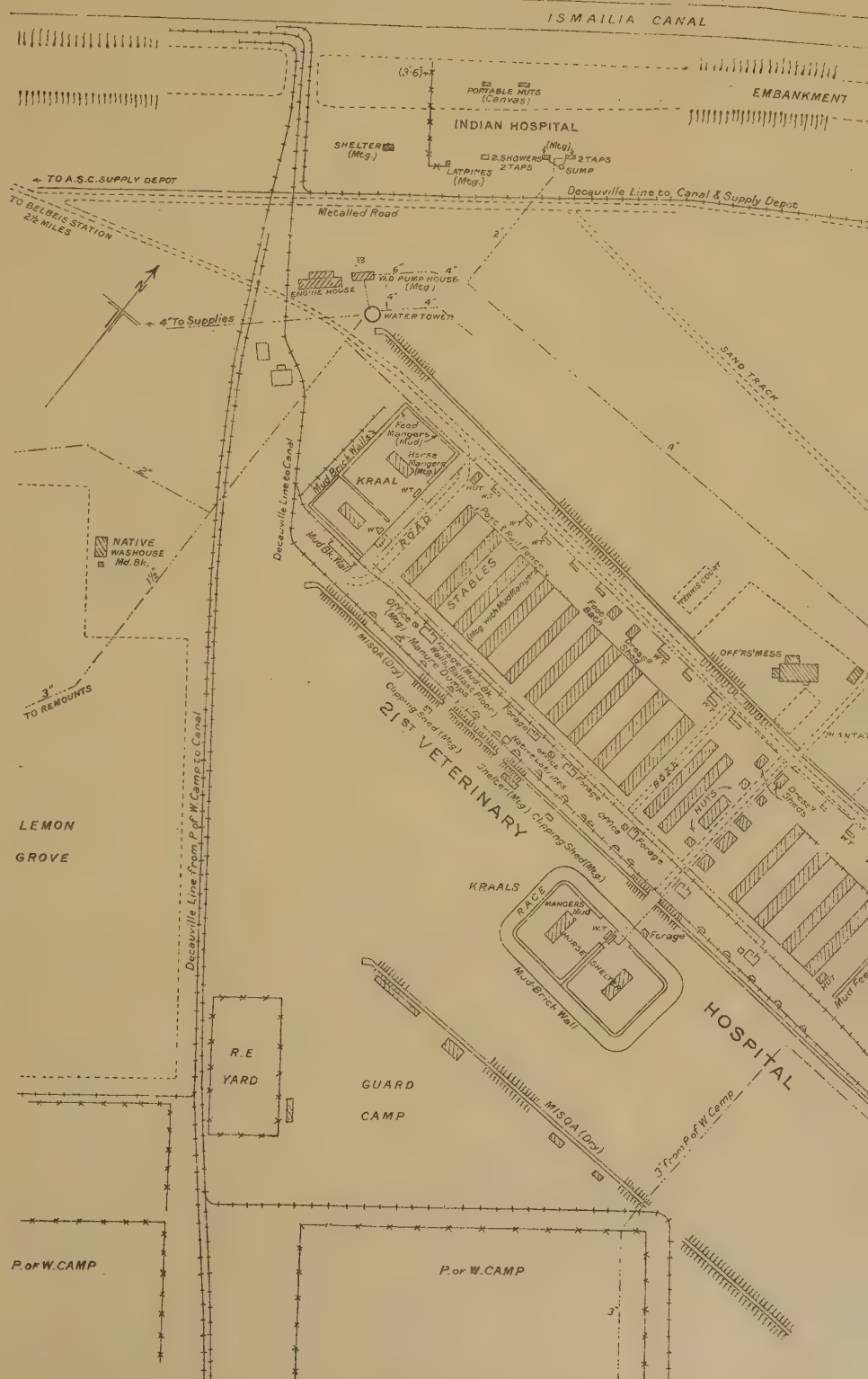
These were arranged for the reception of 1,250 cases each, but towards the end of the campaign it became necessary to increase their accommodation to 2,000 each, and some were actually called upon to accommodate 3,000 on occasions.

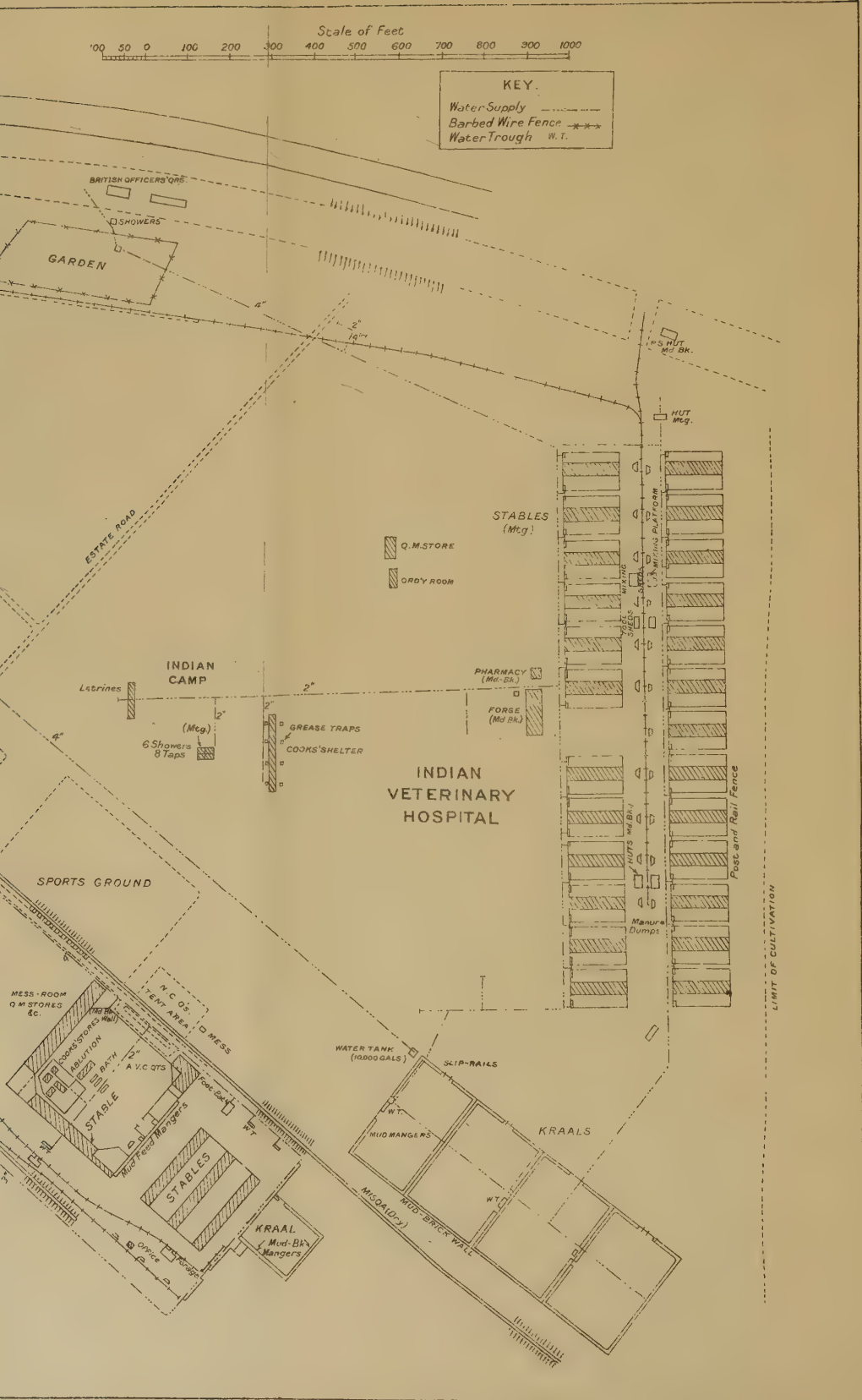
The scale of works and lay-out for these units were as follows :—

- (1) *Stables.* The type of hospital buildings varied according to the locality, with the exception of No. 20 Veterinary Hospital at Cairo, which was accommodated in permanent stone buildings of the pre-war Station Veterinary Hospital, and of the Cavalry Barracks. The principles kept in view were means for the isolation of small bodies with sufficient shelter from the sun in summer and from cold or wet in winter, where necessary. Open shelters, in blocks of 100 standings, consisting of timber uprights, with dried reed roofing laid on broad mesh wire netting were found satisfactory. They were provided for 1,300 horses in each hospital, the space allotted for each horse being 12 ft. long and 5 ft. wide, while the height of the eaves at the lowest point was 7 ft. Each stable, and in some cases each half stable, had a small paddock attached with a water trough, where all patients able to do so exercised and watered themselves. Mangers made of corrugated iron or sun-dried bricks in the form of continuous troughs were constructed in the centre of the standings, so that food could be easily and quickly distributed. Patients requiring particular attention were accommodated in separate stables or boxes with individual mangers, either in specially constructed stables or at the ends of each block. The inside measurements of mangers were 15 in. wide and 14 in. deep for single rows, and 21 in. wide and 14 in. deep for double rows.

The above plan of stabling admitted of each stable being isolated in case of necessity, whilst it remained self-contained in all essential respects.

BILBEIS - VETERINARY HOSPITAL.





- (2) *Kraals*. Three to four kraals in each hospital, capable of holding 125 horses, were subsequently built to deal with the overflows received after active operations. Each kraal was provided with mangers, a water trough and a small open sun shelter, 30 ft. wide in the centre.
 - (3) *Exercise Track*. Oval shape, 10 yds. in width, with a long crush.
 - (4) *Forage Store*. Central. A mixing slab and small expense forage store for each ward.
 - (5) *Dressing Sheds*. One for every 200 horses—each 30 ft. long, with a boiler shed 10 ft. long attached. Floors impermeable.
 - (6) *Pharmacy*. Central.
 - (7) *Operation Shelter*. 25 ft. by 25 ft., eaves 8 ft., centrally situated.
 - (8) *Forge*. Central, 80 ft. long, 24 ft. deep, close to windward, boarded 6 ft. from the ground and screens above. Stocks near forge.
 - (9) *Decauville Railway* for distributing forage and the removal of manure. Each block of stables was provided with a small space at the outer end for dumping dung, with a "polo ground edging" for tidiness.
 - (10) *Water Troughs* for each block of stables situated 24 ft. from the end of the stable, 30 in. wide and 12 in. deep.
 - (11) *Shed* for disinfector.
 - (12) *Mange Baths*.
 - (13) *Clipping Sheds*.
 - (14) *Incinerators*.
 - (15) *Guard Room* for officer.
 - (16) *Quartermaster's Stores*.
 - (17) *Roads* (to carry lorries) to the central buildings
 - (18) *Boundary Fencing*.
- Area : 25 to 30 acres.

The principles of working veterinary hospitals laid down in the "Veterinary War Manual" and "Instructions for the Co-ordinate Working of Veterinary Hospitals, B.E.F., 1915" were followed, and although various alterations in detail were made to meet modified organization and local conditions, the main ideas, as here described formed the basis of the working of these units in the E.E.F. The centralization of authority in the C.O. and decentralization by him to the greatest extent was always impressed on all concerned and remained a guiding principle in all matters.

The personnel of the hospital in the E.E.F. was divided into five subdivisions instead of ten as originally laid down, as the former arrangement was found more convenient to deal with the large number of Egyptians who were employed as syces in order to economize the use of British personnel. Details of the actual staff and the distribution of duties will be found in the appendices.

All hospitals were organized on the group system, wards being established for (1) reception ; (2) discharge ; (3) surgical ; (4) medical ; (5) isolation cases. These main classifications were again divided when necessary, this being left to the discretion of the officer commanding.

It was not found necessary in the E.E.F. to establish special hospitals for the treatment of one particular class of disease or injury, such as mange or surgical cases, each hospital being self-contained for the cure of all descriptions of patients.

The routine followed in dealing with all patients may be summarized in a few words : on arrival they were isolated and tested with mallein, after which they were allotted to the appropriate wards. When cured of their disabilities they were inspected by the C.O. and, if passed by him, they were again isolated and retested for glanders before being transferred to the Remount Department for re-issue.

The system of re-issue to the Remount Department only and not to individual units was particularly insisted upon ; even when it was more convenient to send an animal direct to a unit, the transaction was only made in agreement with the Remount authorities and was carried through on paper as an issue to them. This point was sometimes adversely commented upon by units and individuals interested in particular animals, but the system was sound and had the outstanding merit of simplicity, which is so absolutely necessary in all matters connected with handling large bodies of animals during a campaign. Officers' chargers, labelled with the owner's name, were invariably passed to the Remount Depots, and were then re-issued from them to the individual.

Patients considered unfit for veterinary reasons for further military service were periodically inspected by the director or his deputy, and disposed of according to the orders in force, but Os.C. hospitals had authority to destroy any urgent cases which they considered necessary, without further reference. The usual offices and camp buildings and stores for general administration and for the accommodation of personnel were the same as for other lines of communication units, and do not require special mention. Camp cooking in veterinary hospitals was on a high level, and the cleanliness of everything connected with this department was a large factor in preventing ill-health and adding to the comfort and well-being of the personnel.

Veterinary hospitals on the above lines were established at Alexandria, Quesna, Cairo, Bilbeis, Kantara and Belah for the treatment of horses, mules and donkeys.

Convalescent Horse Depots.

These units were located at Mex (Alexandria) and Maadi, near Cairo. The buildings consisted mainly of open sheds situated in kraals, along two sides of which ran continuous mangers, whilst a water trough occupied a third side. Most of the kraals accommodated 125 patients, but smaller ones were made for animals

MAADI.

CONVALESCENT HORSE DEPOT.



KEY.

- POST & RAIL FENCE ————+———+
- BARBED WIRE FENCE ————x———x
- WATER SUPPLY ————|———|

NOTE:— Water Troughs on West Side of Camp
 Supplied by open channel from channel from
 MDE. LUTISCH'S PUMPING STATION.

requiring special feeding and care. Roads for the passage of forage wagons ran outside each manger to make the distribution of forage easy and to facilitate the frequent removal of the animals' droppings. A portion of stabling was provided as an issue ward, into which those about to be discharged were stabled, groomed and trimmed before issue, and also put through a mallein test.

A crush, race, and clipping sheds were necessary, but the pharmacy mange bath and other technical buildings of a veterinary hospital were not necessary, since all cases requiring treatment were transferred to hospital.

The location of the convalescent horse depot at Maadi was fortunate, in that more green forage was available there than in other places. On occasions it was possible in due course to give animals 60 lb. each per diem. Those received from the front when put on to this diet evacuated enormous quantities of sand for two to three days, after which there was a rapid improvement in their condition. This was found to be the most successful way of eliminating the sand from the intestines.

Camel hospitals were organised on the same general lines as those for horses, but the European personnel was not so numerous and no stables were required for the patients, these being accommodated in lines, with mud-built feeding troughs. They were established at Zeitoun (Cairo), Ismalia, Kantara, Bir-el-Abd, Rafa, and Belah. In most of these situations there was sufficient natural shade from the sun for serious cases, but at Ismalia it was found necessary to supplement this by the construction of a small sun shelter. Protection against the cold winds in the winter was provided by banking up sand around the wards and erecting wind screens made of palm leaves and reeds. No. 2 Camel Hospital was constructed on the kraal system, but the other camel hospitals had a small number of kraals for convalescent camels.

CONCLUSION.

When the course of the campaign changed from one of entrenched positions to one of extreme mobility the wastage in animals, as might be expected, became proportionately high. Up to the end of 1918 the veterinary services had admitted and treated 447,757 horses, mules and donkeys, and 266,070 camels for various ailments and injuries. Of these totals 144,864 equines (32 per cent.) and 61,232 camels (23 per cent.) were sent to hospital as being serious cases requiring long treatment.

The total losses of animals from all causes were 46,615 horses, mules and donkeys, and 31,969 camels. Of the 144,864 equines sent to hospital 118,324 (81·68 per cent.) had been cured and returned to remounts, 18,553 (12·80 per cent.) had died or been destroyed, and 7,987 (5·51 per cent.) remained under treatment. Of the 61,232 camels 38,333 (62·6 per cent.) were cured, 20,070 (32·78 per cent.) died or were destroyed or cast and sold, and on December 31st 2,827 (4·6 per cent.) were still in hospital.

The greater part of the veterinary organization for dealing with the larger number of sick animals was of local conception, and was based on a careful study of past campaigns and a practical knowledge of local prevailing diseases.

However successful previous camel campaigns may have been from a military point of view, they have generally resulted in the rapid extinction of the animals, and the maintenance of numbers has only been possible by renewing them entirely. In one of the Central Asian campaigns of the Russian army, for instance, a force under General Skobeleff with a transport of 12,000 camels returned after some months with one camel only, and in our own Afghan campaign of 1879-80 we lost 70,000 transport animals, a high proportion being camels, the necessary numbers of which could hardly have been maintained for a longer period.

In its endeavour to assist in the creation and maintenance of this branch of the army, the Veterinary Service was fortunate, for its recommendations received due consideration, and the spirit in which the camel duties were undertaken both by officers and other ranks was most praiseworthy. Camel hospitals were established for the reception of serious casualties and a considerable personnel, which included 5 British N.C.Os. and 25 veterinary orderlies for each company of the C.T.C., was specially trained to deal with cases which could be retained with their units. This training included a comprehensive scheme for the treatment of camel mange, a disease which, if allowed to run its course unchecked, will destroy a camel corps on service in from three to six months. Since practically every adult camel in Egypt had the disease, and as all suitable Egyptian camels were employed, it is easy to understand that extensive preparations were necessary to combat its ravages successfully. At first the cost alone of dressings appeared prohibitive, but it proved to be constructive economy in the end, for it enabled a maximum of work to be obtained from the camels in the field with a minimum of inefficiency, and was the means of saving the lives of some thousands of animals which otherwise would have died. The losses in camels from all causes were about 30 per cent. per annum, which included 8 per cent. cast and sold at good prices. This is a high percentage compared with other animals, but, when it is considered that on the average some 40,000 camels were maintained in the field for between two and three years, it represents a distinct advance on previous similar campaigns and is a tribute to the efficient manner in which veterinary duties were carried out.

The sympathetic and ever willing help of the Ministry of Agriculture and of the Ministry of the Interior in Egypt, enabled the Veterinary Service to overcome its difficulties in connection with the veterinary arrangements for these animals. The greater part of the staff of the European and Egyptian veterinary officers of the Ministry of Agriculture was placed at the disposal of the army, and the directors of these services went to infinite trouble to assist the Veterinary Service in every possible way.

The personnel of the Veterinary Services of the E.E.F. consisted of A.V.C. (Regulars, Special Reserve and Territorials), Australian, New Zealand and South African Veterinary Corps, Indian Subordinate Veterinary Corps, and Egyptians. Throughout the war the work of officers and men of all ranks was maintained at a very high standard, hence the service was able to meet all emergencies as they occurred, while their devotion to duty and their loyalty to the directorate was a marked and pleasing feature in the veterinary history of the Egyptian Expeditionary Force.

It was fortunate that the original appointment of Major-General E. R. C. Butler as D.V.S. of the force remained unchanged throughout the campaigns in Egypt and Palestine, as the remarkably successful results of his scientific and practicable policies were to a great extent due to the continuity of technical control that was thus maintained.

TABLE A.

Establishment of a Veterinary Hospital for 1,250 cases stationed in Egypt.

Detail.	Officers.	Warrant officers.	Clerks.	Staff-serjts. and serjts.	Artificers.	Rank and file.	Natives.	Total.	Horses.		
									Riding.	Draught.	Total
Major	1	—	—	—	—	—	—	1	2	—	2
Captains	2	—	—	—	—	—	—	2	3*	—	3
Lieutenants	3	—	—	—	—	—	—	3	3	—	3
Quartermaster	1	—	—	—	—	—	—	1	1	—	1
Warrant officer	—	1	—	—	—	—	—	1	1	—	1
Staff-serjeants	—	—	—	5	—	—	—	5	5	—	5
Farrier staff-serjeants ..	—	—	—	—	1	—	—	1	—	—	—
Serjeants	—	—	—	10	—	—	—	10	2	—	2
Farrier serjeants	—	—	—	—	3	—	—	3	—	—	—
Shoeing-smith corporals ..	—	—	—	—	5	—	—	5	—	—	—
Corporals	—	—	—	—	—	25	—	25	2	—	2
Saddler corporals	—	—	—	—	1	—	—	1	—	—	—
Shoeing-smiths	—	—	—	—	14	—	—	14	—	—	—
Saddlers	—	—	—	—	2	—	—	2	—	—	—
Privates	—	—	—	—	—	53†	—	53	1	—	1
Jemadars	—	—	—	—	—	—	15	15	—	—	—
Syces	—	—	—	—	—	—	417	417	—	—	—
<i>Attached :—</i>											
Drivers A.S.C. (Horse Transport)	—	—	—	—	—	12	—	12	—	24	24
Drivers for Vehicles (Mechanical)	—	—	—	—	—	2	—	2	—	—	—
Total	7	1	—	15	26	92	432†	573	20	24	44

Note.—The above establishment includes 8 lance-serjeants and 4 lance-corporals.

* One Captain, 2 horses.

† Includes batmen for officers.

‡ 75.7 of personnel.

TABLE A—*continued.**Transport.*

Detail.					Vehicles.	Drivers.	Horses.
Carts	Ambulance	..	..	..	2	2	4
	Tip	..	..	..	5	5§	10
	Water	..	..	..	1	1	2
Wagon, G.S.	..	..	..	..	2	4	8
Lorry, 30-cwt.	..	..	..	..	1	2¶	—
Total					11	14	24

§ Provided from the Base Horse Transport Depot.

¶ Provided from the Base Mechanical Transport Depot.

TABLE B.

*War Establishment.**A Convalescent Horse Depot for 1,200 Horses stationed in Egypt.*

Detail.	Officers.	Staff-serjts. and serjts.	Artificers.	Rank and file.	Natives.	Total.	Horses.		
							Riding.	Draught.	Total.
Captain	1	—	—	—	—	1	1	—	1
Lieutenant	1	—	—	—	—	1	1	—	1
Quartermaster	1	—	—	—	—	1	1	—	1
Staff-serjeants	—	1	—	—	—	1	1	—	1
Serjeants	—	2	—	—	—	2	2	—	2
Farrier serjeants	—	—	1	—	—	1	1	—	1
Shoeing-smiths	—	—	9*	—	—	9	—	—	—
Corporals	—	—	—	4	—	4	—	—	—
Privates	—	—	—	16†	—	16	—	—	—
Batmen	—	—	—	3	—	3	—	—	—
Jemadars	—	—	—	—	12	12	—	—	—
Syces	—	—	—	—	168	168	—	—	—
<i>Attached :—</i>									
Drivers for vehicles	—	—	—	12	—	12	—	—	—
Drivers for spare draught horses	—	—	—	1	—	1	—	24	24
Drivers for spare	—	—	—	1	—	1	—	2	2
Total	3	3	10	37	180	233	7	26	33

Note.—The above establishment includes 4 lance-corporals.

* Includes a corporal.

† Includes a cook.

Transport.

Detail.					Vehicles.	Drivers.	Draught. Horses.
Carts, water	..	..	..	..	1	1†	2
Ambulance, horse	..	..	..	..	1	1†	2
Wagons, G.S.	..	..	..	..	5	10†	20
Wagons, G.S., for spare draught horses	..	..	..	..	—	1†	2
Drivers, spare	..	..	..	..	—	1†	—
Total	..	..	..	..	7	14	26

† Provided by the A.S.C.

TABLE C.

*A Field Veterinary Detachment, Egypt.**War Establishment.*

(i) Personnel and Horses.

Detail.	Officers.	Personnel.			Artificers.	Total.	Horses.		
		Staff-serjts.	Serjts.	Rank and file.			Riding.	Draught.	Total.
Captain or Lieutenant ..	1	—	—	—	—	1	1	—	1
Staff-serjeant	—	1	—	—	—	1	1	—	1
Serjeant	—	—	1	—	—	1	1	—	1
Corporals	—	—	—	3	—	3	—	—	—
Privates*	—	—	—	23†	—	23	—	—	—
Shoeing-smiths	—	—	—	—	1	1	—	—	—
<i>Attached :—</i>									
Driver, A.S.C., for vehicles (Horse Transport) ..	—	—	—	1	—	1	—	2	2
Total (including attached)	1	1	1	27	1	31	3	2	5

* Natives may be employed when conditions admit.

† Includes 1 batman and 1 cook.

(ii) Transport.

Detail.	Vehicles.	Drivers.	Draught Horses.
Wagons, G.S., limbered	1	1*	2
Total	1	1	2

* Provided from Base Horse Transport Depot.

TABLE D.

*Mobile Veterinary Section (Camel.) Imperial Camel Brigade.**War Establishment.*

(i) Personnel and Animals.

Detail.	Personnel.					Animals.			
	Officers.	Staff-serjts. and serjts.	Rank and file.	Natives.	Total.	Riding Horses.	Riding Camels.	Baggage Camels.	Total.
Veterinary officer	1	—	—	—	1	1	42	—	43
Serjeants	—	2	—	—	2	—	—	—	—
Corporals	—	—	2	—	2	—	—	—	—
Raises	—	—	—	2	2	—	—	—	—
Natives*	—	—	—	35	35	—	—	—	—
Baggage camels	—	—	—	—	—	—	—	10	10
Total	1	2	2	37	42	1	42	10	53

* To include two clippers.

TABLE E.

Particulars of Local Labour.

	Approximate numbers employed in each class.		Whether paid direct to employee or to contractor.	How employed.	How obtained and where.	Fee, if any, paid to agent for obtaining labour.	Period of engagement.	Number of actual working hours a day.	Whether rations are supplied and value of such rations.	Whether clothing is supplied and value of such clothing.	Whether accommodation is provided.	Any other emoluments.
	Number employed.	Rate of pay.										
Syces	..	each day	Paid direct to employee.	Horse keepers.	Through Rais locally.	nil. nil. nil.	{ Daily and } { week- } { ly. }	8, 9 and 10 hours.	nil. nil. nil.	† Greatcoats (old Milly.) for night guards at 21 Vet. Hos. only. Value 7s. 7d.	At 21 Vet. Hos. only and if desired.	nil. nil. nil.
Rais	..	4½ pt. 5½ pt. 6½ pt.										
Bash Rais	..	1 8 pt.										
Interpreters	..	2½ 30pt.	—	Office.	{ 1 by Intelligence GHQ. 1 by F. in E. }	—	Contract	—	1s. 8d. per day. nil.	Uniform. nil.	Yes. nil.	nil. nil.

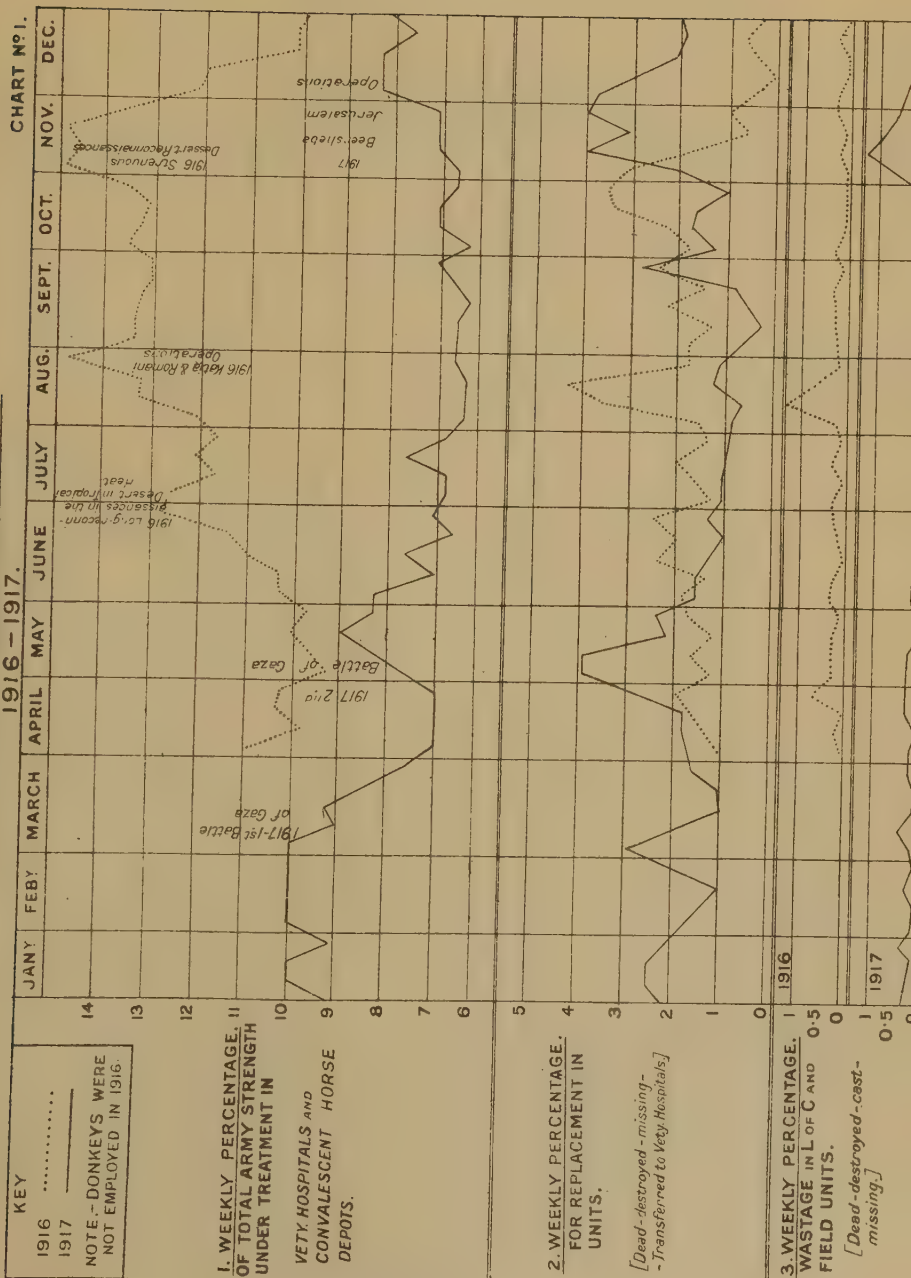
* Additional or less numbers are employed in proportion as the number of patients exceed or are less than War Establishment.

† 24 permanent syces at No. 26 Veterinary Hospital are allowed £1 each for outfit.

‡ One at 26 Veterinary Hospital, Alexandria, and one at No. 20 Veterinary Hospital, Abbassia.

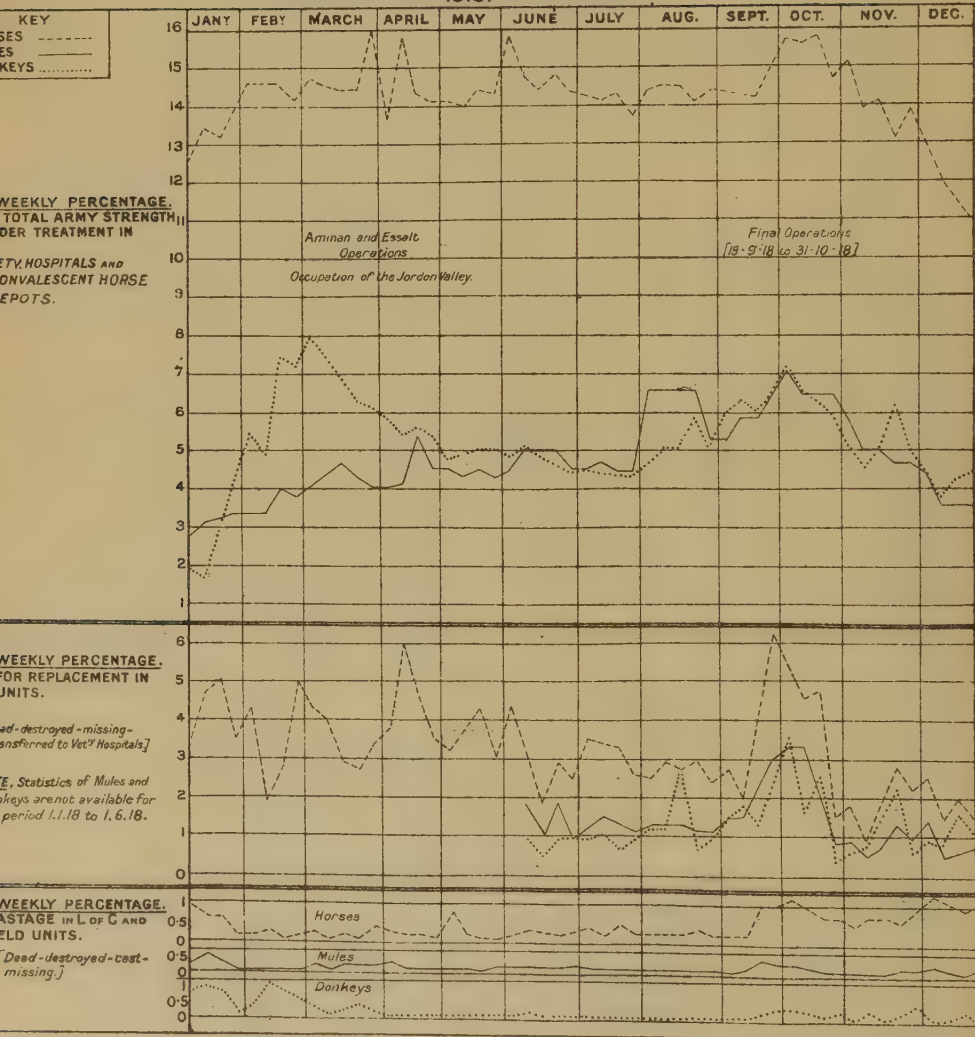
EGYPT AND PALESTINE. HORSES - MULES AND DONKEYS.

To face page



EGYPT AND PALESTINE. **HORSES - MULES AND DONKEYS.** 1918.

CHART N° 2.

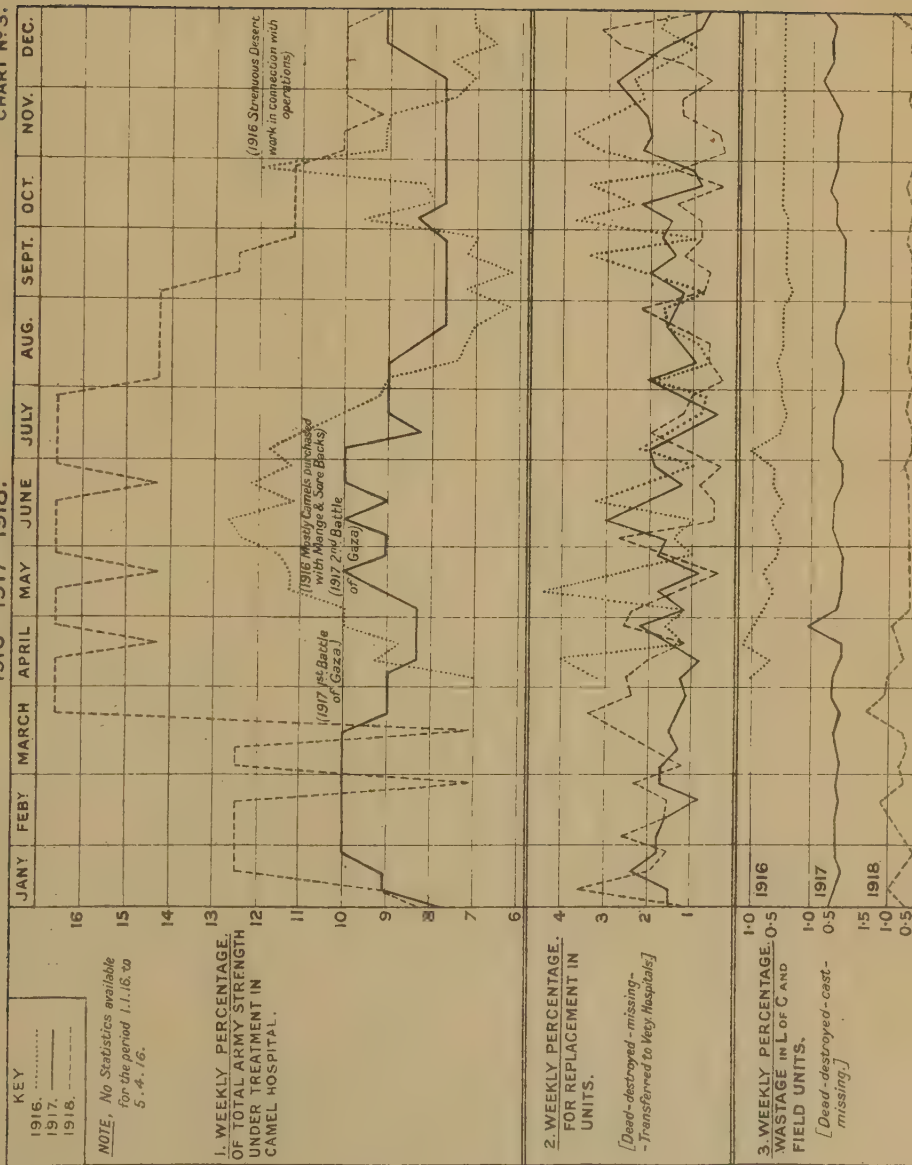


EGYPT AND PALESTINE.

CAMELS.

1916-1917-1918.

CHART No 3.



CHAPTER XII.

THE VETERINARY SERVICES WITH THE BRITISH FORCES IN THE BALKANS.

Landing and Distribution of Troops.

THE British army in the Balkans was only a part of a force composed eventually of troops of six different nationalities. Before any of our own troops arrived the French had two divisions there, one of which was fighting beyond the Serbian border. The 10th Division was the first of the British troops to land, and was sent up at once to Doiran in support of the French division.

The 22nd and 28th Divisions disembarked during November, 1915, and were closely followed by the 26th and 27th Divisions. Extra-divisional units continued to arrive at intervals; and, early in the spring, came the mounted brigades. It was not until the autumn of 1916 that the 60th Division landed, bringing the force up to six divisions and two mounted brigades. These were ultimately formed into two army corps—the 12th and 16th.

About the middle of December, 1915, the French troops and the 10th Division were forced to retire from Serbia, and a defensive line was taken up around Salonika. The centre of this line was almost within gun-range of the town. The positions extended from beyond the Galika, the French portion of the line, to Stavros, at the mouth of the Struma, some sixty miles east of Salonika. By the end of the same year the whole line was advanced, the British position then extending from Karasonli, close to the Vardar, by Lakes Doiran and Butkova, and then along the valley of the Struma—the main distance from the base being about fifty miles. What remained of the Balkan railways only helped to serve the Doiran sector of the line. The road communications to Doiran followed the ancient Via Ignatia, branching then to the north. The other main road to the British front was the Turkish road leading to Seres, across the Struma Valley. The roads had to be metalled and constantly repaired, the work falling mainly on the horse transport companies. The road leading to Stavros remained practically unmetalled, but here sea transport was to a great extent relied on. There were innumerable side roads and tracks leading to the front positions.

Climate.

The country is mountainous, and most of the gun positions were on the hill tops and the forward slopes of the hills. In the Struma sector they were, however, in the valley. Only pack transport could reach many of the gun positions in the hills; and in the river valley the deep sand often made the passage of wheel transport difficult.

The troops had their first experience of a Balkan blizzard in November, 1915, when they were landing. This swept the country for several days and was the precursor of a winter more than ordinarily severe. The winds from the north-west and north-east are cold and piercing, and there is little, if any, shelter in this treeless country. The winter is the season of greatest rainfall, and during the rains the mud in the camps and on the unmetalled roads was as bad as, if not worse than, it was in France.

The climate in summer is semi-tropical, and the heat of the sun is a force to be reckoned with. The low-lying positions of the country are malarial, and this disease took its full toll throughout the operations. Biliary fever of horses in a virulent form is enzootic, and has given trouble in all the Balkan wars. It caused considerable sickness and loss in the first summer, but thereafter preventive measures were successful in controlling, and finally in eliminating its occurrence. Very fortunately mules proved immune to this disease.

Not a negligible feature of the climate is the "high percentage" humidity which renders both heat and cold less bearable. There is, moreover, a remarkable variability of climate hardly less trying. To give an example: on December 1st, 1917, the maximum temperature at a typical station was as high as 66° F., and the minimum 40° F., while less than a week later the maximum temperature was at zero and the minimum 13° of frost. During the first winter both horses and mules suffered considerably from "chill." They had landed with heavy coats, and it was impossible to clip them owing to the failure in the supply of clipping machines. It was a common thing for them to be wet through when working and then to be chilled to the bone by the cutting winds. On the lines of communication, where the work was very heavy, whole companies at a time were affected in this way.

Pneumonia on this front was unknown, as the animals lived always in the open. Instead, they seemed to shrivel up and rapidly to lose flesh until they were reduced to living skeletons—the mules suffering even more than the horses.

*Unfavourable conditions leading to large initial wastage
of Animals.*

With the batteries once in position, the gun horses were mostly idle, and with every available man with the guns horse management proved difficult. On the long road communications the horse transport companies, provided even as they were on a grand scale, were overworked. They were, moreover, widely scattered in detachments, and it was difficult at first to bring into effect any general supervision of their management.

With a force of this magnitude so far overseas, and with the constant sinking of supply ships, forage troubles were to be anticipated. Forage (hay particularly) occupies so much room in sea transport that it was bound to fail. The shortage of hay stuffs meant more

in the beginning, when most of the animals were below a good level of fitness, than later when this level was raised, and when, as only fit horses can, they managed with less bulk of food. One effect of the hay shortage was an epidemic of sand colic on a wide scale. Denied the bulk for which they craved, horses and mules filled themselves with sand. It was unfortunate that at first only uncrushed barley was available. Quite 60 per cent. of this was wasted because it passed through the animals unchanged. The uncrushed barley, moreover, caused colic and scouring. Unfortunately, months passed before the supply depot, with the best will in the world, was able to get this grain crushed in mills at the base.

At this period the wastage at the front and on the road lines of communication was very heavy—and large demands were made on the reserves of animals at the base. It would have had good effect if these reserve animals had been fit and able to make a stand in the field; but this was not the case and, more often than not, they went at once to increase the flow of debilitated animals to the base.

It need hardly be said, with the situation at its worst, that there was the certainty of better results when organization had time to make itself felt. The level of horse management in the field had, at all costs, to be raised, and a solid reserve of fit animals to be built up at the base. The part played by the administrative veterinary officers of divisions, supported whole-heartedly by divisional commanders, brought about what was no less than a revolution in the condition of animals at the front. For lack of such effective support the same high standard of animal fitness was never reached either in extra-divisional units at the front or in those on the lines of communication, where the wide distribution of transport units made administrative work very difficult. The officers commanding the veterinary hospitals deserve credit for the lead they gave in the movement successfully made to condition systematically the reserve of animals at the base.

ORGANIZATION IN THE FIELD.

Improvement in Horse Management.

The root of the trouble at the front was the difficulty of providing exercise—regular and regulated. This led to rations being only partially digested, with consequent ill-health and unfitness. This radical evil was overcome by the expedient of letting the horses and mules loose instead of keeping them constantly tied up in lines. They were allowed to wander about at their own will for the greater part of the day, and were only assembled at feed-times. The grazing was not always of great value, but the freedom of movement, and the very considerable area of ground they covered in their wanderings, provided exercise. It was soon found that this of itself sufficed to enable the animals to digest the ration entirely. In a short time animals which were previously poor and unthrifty carried

full flesh and healthy coats. It naturally took time before this practice became general. It spread largely by the force of example, the good results being obvious, but in the end it was insisted on by divisional commanders. Behind the whole of the front line the terrain was dotted with loose horses and mules. In cold and rain they turned tail to the wind and the weather. In the extreme heat of the summer they got together in groups, as sheep do, many with their heads in the shade of the flanks of others. They trailed out when let loose, knowing what to do and where to go, and they were punctual, almost to the minute, in filing back to their own lines at feed times, quite without direction and often at a slow jog-trot. Horses that before were unable, when called upon, to do half an occasional day's work without showing fatigue, now became capable of exhausting work. This was proved when, on more than one occasion, divisions were moved from one end of the long front to the other. It was proved more conclusively in the general advance. The whole force was then on half the grain and less than a quarter of the hay ration. With hardly a rise in the low sick-rate, the 26th Division, starting from Doiran, marched 500 miles rapidly through the length of Bulgaria, under the worst weather conditions and over the worst roads. The 27th Division, which followed, was tried almost as highly and came out just as well. Another portion of the force, starting from Stavros, experienced greater difficulties. Here the 200 miles along the coastline of Thrace proved almost impassable, but again proof was given of how fit the animals of the division were. They showed their fitness further, at the end of the advance, by their quick recovery of full muscle and strength.

The good results following the turning loose of the horses proved the beginning of a new interest being taken in them. Time and labour were found for paving the horse-lines and for putting up walls capped with screens of brushwood or reeds against the wind. In the absence of tibben, it became the general practice to chaff three or four pounds of the long hay to mix with the grain feeds, and this was done entirely with improvised means of chaffing. The same keenness was shown also in many other ways. It was the exception to find animals in any divisional unit below the general high standard of condition; the same can also be said of most units, not included in divisions, at the front.

Difficulties on the Long Road Communications.

The problem of horse management on the lines of communication was a different one. Here the great difficulty was to regulate the work. The horse transport companies were, as a rule, split up into small and scattered detachments. There was a continuous call on these to put as many wagon teams on the road as possible, day in and day out, irrespective of the ability of the animals to stand the work; and as often as not these demands had to be met at all costs. It was the repeated experience of inspecting officers to find

the animals of detachments, and even of entire companies, which a short time before had been in fair condition, hopelessly poor and emaciated, often from overwork and exposure combined. There were, nevertheless, transport companies on the lines of communication which could compare favourably even with the divisional trains. To the end, however, the average standard of management and condition of animals on the lines of communication remained far below the level attained at the front, while sickness and wastage were very considerably higher.

It is needless to state that, with a force composed of different nationalities, exchanging positions and using the same roads, there were many additional chances of infection of mange, glanders, and other diseases. It was also common to see in the Greek villages ponies and mules affected with these diseases and epizootic lymphangitis. The drinking places on the roads, open to all and sundry, were a particular danger.

First Aid System.

The wide distribution of the force threw great strain on executive veterinary officers, of whom there was generally a shortage from sickness and failure in the arrival of replacements from home. In view of this situation, special steps were taken from the beginning to train N.C.Os. in the field in police measures directed against contagious diseases, and to create a reserve of N.C.Os. thus trained. They were kept up in these sanitary duties, and instructed in a well-defined system of first-aid work. The responsibility was thrown on them of detecting mange, glanders, etc., and of isolating suspected animals immediately and effectively until these could be seen by the executive veterinary officers under whom they were serving. With a view to overcoming the possibility of impaction, definite orders were given for the treatment of colic by dissolving the aloes provided in the unit chests, and to give it in solution to secure its more rapid action. These A.V.C. serjeants were provided with a standardised wound-dressing, and were made responsible for keeping themselves supplied with the strictly limited number of stores needed for their work. These they could obtain either from the advanced depots of veterinary stores or from the mobile veterinary sections. The wound-dressing used was the oil and creosote preparation, the formula of which is well known, and to this was added 30 per cent. of petrol. The hair was clipped away from wounds, and wound and skin sterilized by being soaked with the dressing. The wounds were then so effectively covered that the affected animals sent down to the base arrived at the hospitals still perfectly clean. This routine of wound-dressing probably saved the animals of our force from epizootic lymphangitis which was very prevalent in the Allied Armies. The French, for instance, had at one time 600 cases of this disease in one hospital. Amongst our animals, only thirteen cases all told occurred in the three years, five of which broke out in the transport of the 11th Veterinary Hospital shortly after landing from Egypt.

Mobile Sections and Veterinary Road Posts.

The method of leading twenty or more horses on a single rope was adopted as soon as the idea filtered through from France. It proved most effective, and enabled mobile sections and veterinary road posts to do three times the amount of work. N.C.Os. and men for the road posts were drawn from the veterinary hospitals. The return of sick to the base during the advance over two long road lines was a heavy task, but the organization proved quite equal to the strain. A single motor-ambulance carrying two horses did great service in clearing exceptionally serious cases on the main roads. Otherwise dependence had to be placed on the slow-moving horse-floats.

Contagious Diseases and Work of the Laboratory.

A bacteriological laboratory was not allotted to the force, and one had accordingly to be formed. This did very good service under Major Moir who systematized the laboratory diagnosis of the variety of diseases which had to be dealt with, including rabies of which there were several outbreaks. Early in the operations, mallein proved quite unreliable for mules and, on his own initiative, Major Moir, assisted by Colonel Dudgeon, Pathologist of the Medical Directorate, who also supplied the antigen, succeeded in working out a perfectly reliable method of the Complement Deviation Test. Blood sent from any part of the field could be used, and all suspects, horses and mules, were dealt with by this test. By the request of the French, a large accumulation of their indefinite reactors to mallein were tested by Major Moir. In this series some 60 or 70 per cent. were released as definitely free. The post-mortem examinations made on the reactors proved the accuracy of his method.

Outbreaks of mange in this force were practically confined to the first eighteen months, the period when units of the force continued to land. The fact that nearly all animals arrived in the country with heavy coats added in the beginning to the difficulty of eradicating this disease. Moreover, diagnosis was obscured by widespread lice infestation. The 28th Division arrived with two units infected with sarcoptic mange, and ten others with psoroptic mange. Sarcoptic mange was also discovered in two units when the 27th Division disembarked. Two heavy batteries coming from England in the first summer had all three forms of mange, and ring-worm in addition. Mange was found also in three other heavy batteries landing in the beginning of the second winter. The 60th Division brought psoroptic mange in five artillery units which arrived in January, 1917.

As a general rule, mange was treated in units as it occurred, and very few cases were taken into hospital. Sulphur-and-oil was relied upon as a dressing, applied three times, at intervals of a week, the treatment thus taking only a fortnight. To avoid dermatitis, the oil and sulphur dressing was washed off the day following its application.

Only thirty-two cases of mange occurred in the force during the period from 1917 until the break-up of the force. All of these were fresh infections contracted in camps taken over from other forces, and none occurred in units previously infected.

Of other diseases, little need be noted. The force was practically free from ulcerative lymphangitis which gave trouble on other fronts. A few cases occurred during the last year in horses coming from France. Cases of specific ophthalmia occurred each summer, but this disease did not give any great degree of trouble.

A number of cases of poisoning amongst horses occurred at Stavros in the spring of 1917, due to a plant picked up while grazing. This plant caused clinical symptoms when fed experimentally to a cast horse. It was identified by the Director of the Royal Botanical Gardens, Kew, as *Marsdenia Arecta* R. Br. (Asclepiadaceae) which contains a glucoside (Asclepiadin) known to cause paralysis and death from cardiac paralysis.

Administrative Veterinary Officers in the Field.

Until nearly the end of operations, there were D.A.Ds.V.S. with divisions, but no administrative officers allotted to corps. They took over the charge of corps and army units nearest to them. The disadvantages of this organization were compensated for by the divisional officers having only one master. In practice, this arrangement worked satisfactorily, though at first sight it may appear to be rather unwieldy.*

The names of the following officers who served with divisions will be long remembered by all who were in any way connected with their work on the Balkan Front :—

Major G. Black (10th Division).

Major G. Lloyd (10th Division).

Major H. C. Dibben (22nd Division).

Major A. C. Murray (22nd Division).

Lieut.-Colonel W. A. Jelbart (26th Division, afterwards A.D.V.S. 12th Corps).

Major D. O. Turnbull (afterwards A.D.V.S., 16th Corps).

Major R. W. Mellard (28th Division).

Major T. Herrick (28th Division).

Major W. J. Dale (60th Division).

The arduous duty of continually inspecting, from G.H.Q., units at the front and on the interminable roads, was devotedly carried out in succession by Lieut.-Colonel W. J. Tatam, Colonel Larnder, and Lieut.-Colonel P. J. Harris.

ARRANGEMENTS AT THE BASE.

Veterinary Hospitals.

A section of the 17th Veterinary Hospital was the first of the hospitals to arrive, and was located at Lempet, just to the north of

* This was practicable in a comparatively small force.

the town. It was followed about the end of November, 1915, by the 15th Veterinary Hospital, under Major Godwin, with its full equipment and transport. A start was then made to lay out the first regular hospital on an excellent site to the west of the town near the Monastir Road and close to the military railway siding. This grew rapidly into a hospital capable of dealing with twice the 1,250 cases for which its establishment was intended. Without any attempt at ornamental effect, and relying only on spacious planning and proportions, this hospital quickly earned praise as a model camp. It furnished an example of what a well-equipped unit could do with its own resources and with men of all trades in its ranks. The Royal Engineer Services were at the time so fully employed in other work that they could give little assistance in the way of construction, but, seeing that material could be used advantageously and without waste, they supplied this ungrudgingly. As soon as it was possible, standardised watering and feeding troughs were, however, put in hand in the R.E. workshops, and finally shedding was erected under contracts made with firms in the town.

A feature of this hospital and others which followed it was an annexe consisting of eight enclosures and an exercising track. Convalescents and all cases not requiring individual treatment were kept loose in the enclosures of this annexe, which easily held 1,200 horses or even more when required. The ground was laboriously stoned and paved where necessary, and every detail in connection with the annexe was carefully constructed. When complete and in use, from thirty-five to forty men sufficed for working the annexe, leaving the large balance of the hospital establishment for other work. Labour began to be saved as soon as the track and the first enclosure were ready, and as each new enclosure became available for use, more men were freed to complete the rest of the hospital. In two or three months the horses from the first few enclosures began to be issued and were the first of many thousands of fit animals discharged from this and other hospitals which were to follow.

In the spring of 1916, the section of No. 17 Veterinary Hospital was raised to the establishment of a 1,250 horse hospital under Major Doyle. Handicapped by bad ground—for there was at the time no other site available near water—Major Doyle put together a hospital on the same plan as that of No. 15 Veterinary Hospital.

In September of this year the 18th Veterinary Hospital came from Egypt. A supply of water had, in anticipation, been laid on to an extensive ground close to No. 17 Veterinary Hospital. This hospital was not brought into use until it was finished, which gave Major Rae, who commanded it, a better chance to lay it out and push the work to completion.

Before any more hospitals arrived, some ground west of the town and above No. 15 Veterinary Hospital had become available by the laying on of a large water main from a source some distance

away. This was an engineering work that could not have been done earlier. The new ground was extensive, on rolling downs and on dry soil. Five remount places were erected on one side of a deep nullah, each on the plan of a hospital annexe. On the other side, in due course, two additional veterinary hospitals were placed: the 11th Veterinary Hospital, under Major Harrison (afterwards Lieut.-Colonel) and the 30th Veterinary Hospital. With the superior ground and the experience gained in putting up the other hospitals, these were naturally the most perfect when completed. The 11th Veterinary Hospital was built by Lieut.-Colonel Harrison. Major Rae, who had been most successful with his own, was borrowed for a time to start the construction of No. 30 Veterinary Hospital, before the establishment of this hospital arrived from home, when it was completed by the officer commanding, Major McVean.

The work done by these hospitals cannot be too highly praised. They vied with each other in perfecting everything connected with the horses, as well as all matters of interior economy, and they won unstinted praise on all sides. There was much to learn in the beginning on the surgical side from France. To Captain Peatt of No. 17 Veterinary Hospital is due the credit for the best advance in this direction. At an early date he introduced the Carrel and B.I.P.P. methods of wound treatment, and a report on a large series of cases he treated was published in the "Veterinary Journal," Vol. 25, 1918. As far as possible the worst surgical cases were transferred to the wards of No. 17 Veterinary Hospital. Matters were simplified by arranging for the bulk of surgical cases to be dressed as a matter of routine by the first-aid method already referred to as used in the field; otherwise a single officer could hardly have undertaken the whole surgical work of a hospital. The dressers in the hospitals were the men in training for N.C.Os. in the field, and they had abundant experience before they were sent to the front.

It was found difficult to keep down the number of flies about the hospitals until a method of completely burning manure and refuse was copied from No. 15 Veterinary Hospital where it had been devised. This method required only a tenth part of the manure to be burnt on grids, the great bulk of it, including mud from the horse-enclosures, being stacked in mounds close by. The ashes falling through the grids were raked out and thrown on the mounds which ignited, and, once fired, smouldered in the wind until they were burnt completely through. This method was so effective that it was finally adopted at nearly all other camps at the base and at many of those in the field.

The work done by the hospitals must be judged by their output, which reached an average of 86·6 per cent. of the admissions during the three years. It stands to their credit that all the animals they admitted were in due course discharged in the best condition and fit for immediate hard work. To this rule there were few exceptions. There were no intermediate convalescent depots.

Although their establishments were continually far below strength owing to failure of reinforcements, the hospitals found men to replace casualties among the N.C.Os. attached to field units, and also furnished men for the numerous road detachments. Their labour-saving organization enabled them also to do much extraneous work. The selection and final disposal of the thousands of horses destroyed as unfit for sale, when the force was being broken up, fell largely on the veterinary hospitals to carry out. They salvaged the hides and hair, and the hoofs for making glue; and some thirty tons of horse fat were recovered by the extracting plants put up at two of the hospitals. It was not possible, however, to recover the fat from the large number of carcasses which had to be disposed of towards the end. There were days, for example, when from four to five hundred animals were destroyed.

During 1918, when the sinking of ships reached a climax, a movement was made in the force to cultivate forage on a considerable scale. The hospitals contributed by ploughing and sowing 1,500 acres. They handed over more than half of the standing crops to an agricultural section of the supply depot, but they managed to reap themselves about 600 tons: this was used eventually in the hospitals in lieu of the same amount of forage from the supply depots. The final duty of the establishments of the hospitals was to dismantle the premises they had themselves put together, and they did this with characteristic thoroughness.

The 15th Veterinary Hospital was transferred to France in January, 1918, and the 30th Veterinary Hospital in May of the same year.

The 17th Veterinary Hospital was demobilized early in the following year, and the 18th Veterinary Hospital, reduced in establishment, was transferred to the Army of the Black Sea with a section of the base depot of Veterinary Stores.

Remounts.

The supply of remounts for the force did not begin to arrive until the middle of the winter, but they then came rapidly and almost without interruption until the following autumn. From this time onwards only some small lots of horses were received and no more mules. The supply of remounts was apparently calculated on an anticipated wastage in the field per month of 10 per cent. of horses and 5 per cent. of mules. Whether this was actually the scale in mind or not, they came in numbers that would meet this wastage for a considerable time ahead.

The transport of remounts by sea was carried out extraordinarily well, and the loss from sickness in transit was nearly negligible. All ships were roomy and well ventilated. All had permanent "ramps" which allowed of sick animals being brought at any time into fresh air, and all were in charge of veterinary officers kept on this duty permanently. A number of the transports carried mules loose in pens; these travelled far better than any of the rest and were

fitter at the end of the voyage. Generally speaking, remount ships were singularly free from mange. A few cases only occurred in ships from Devonport and in one from America. No cases of glanders were discovered on arrival at Salonika, and no horses or mules reacted to mallein when tested on landing. Curiously enough, however, glanders broke out amongst an accumulation of mules, affected with catarrh when disembarked, and segregated for safety after what must have been for the mule an unusually long incubation period.

The arrival of upwards of 50,000 remounts in less than a year proved embarrassing, since it was impracticable to find room for this number or to manage them properly. It was not until the new water supply, already referred to, was laid on that anything approaching suitable arrangements could be made for them. Until that time all kinds of expedients, such as grazing camps, were tried, none of which gave good results. Happily the situation was somewhat relieved by the transfer from time to time of over 12,000 surplus reserve animals to Egypt; but for nearly two years the remounts at Salonika contributed over a third of the number of sick in the hospitals. The rate of sickness amongst them very far exceeded the rate on the lines of communication, where the conditions were so bad and exhausting work was a ruling factor. It was fortunate that during this time the animals discharged from hospitals were in hard condition, shod, and ready for immediate work.

As each hospital turned out an average of 200 weekly, these animals went a long way to supply demands made from the field. Subsequently the remount squadrons had fit animals well above their requirements.

The long-rope method of leading horses was adopted by the remount service for delivering animals at the front.

Figures for the Campaign.

The numbers discharged from the veterinary hospitals did not always represent the full number available for discharge. It was difficult to take up weekly from the enclosures more than 200, and to shoe, clip, and trim them, for going away. They required very little in the way of grooming. Their coats were invariably clean, and the hair of the manes and tails unmatted and free from dandruff. This was secured by the natural conditions of life and the complete digestion of food.

The percentage of sick in hospital reached 12 per cent. of the animal strength. This figure was raised suddenly to 17 per cent. when two divisions and practically two mounted brigades were transferred to Egypt, together with a large number of remounts. There was the same number of sick in hospital, but this had to be put against a greatly reduced animal strength.

In the bad year of 1916, the difference between the number died, destroyed, and sent to hospital, and the number recovered from the hospitals, or in other words, the net wastage, was 24 per

cent. for the year or 2 per cent. monthly. The casualties in the remount depots, included in this figure, account for at least a third of the total wastage. The number to be made good in the field was accordingly far less than 2 per cent. monthly. In 1917 the net wastage, remounts included, fell to 12 per cent. for the year, or 1 per cent. monthly.

In 1918, the numbers returned from the hospitals outnumbered the total wastage on the front and in remount depots by 3,909. The reduction in the force partly explains this unusual occurrence. Still, it shows at least that the wastage at the front was extremely low, more especially when it is remembered that this was the year of the final advance.

The total wastage in the veterinary hospitals on this front for the years 1916, 1917 and 1918, was only 11·3 per cent. of admissions.

It is to the credit of the Veterinary Service that contagious diseases were unknown in the British force during the last eighteen months of the operations, although the opportunities of infection from without were increased rather than diminished. It went far that a clean supply of animals from the base could be implicitly relied upon. The facilities for the observation of disease afforded by the system of management set up in the hospitals and remount squadrons practically did away with anxiety on that score.

From first to last a spirit of optimism pervaded all ranks, based on the consciousness that their work was sound and sure. Their patience and discipline endured not only to the end of the campaign but also afterwards in the tedious and often repugnant duties necessitated by clearing up and evacuating this theatre of war.

CHAPTER XIII.

THE VETERINARY SERVICES IN MESOPOTAMIA.

Introductory.

EXCEPTIONAL conditions prevailed in this theatre of operations, and in order to visualise, to some extent, the difficulties which had to be surmounted in connection with the organization, administration, and general working of the Army Veterinary Services, it is necessary to refer to the geographical, climatic, and other special features of the various parts of the country.

Mesopotamia consists of a great depression extending from the northern corner of Syria and the high plateau of Anatolia and Armenia down to the head of the Persian Gulf. The eastern side is formed by the mountainous edge of the Persian plateau. The western and south-western sides are bounded by the Syrian and Arabian deserts, which gradually slope from the highlands of Syria and the plateau of Arabia to the valley of the Euphrates.

Length, 770 miles.

Greatest breadth, about 380 miles.

Breadth near Baghdad, 150 miles.

Total area, about 200,000 square miles.

Zones.

1. From the Persian Gulf to Baghdad, 350 miles of stoneless, alluvial plain, with a fall of only 220 feet to the sea.

2. A district of rolling and undulating plain intersected by outcrops of rocks and by spurs from mountains.

3. A district of mountains and hills with passes at altitudes of 5,000 to 6,000 feet, and Alpine conditions north of Mosul and in Persia.

Climate.

Rain falls during the winter months—November to March—and the rivers are highest during April and May.

Hot months, May to September. Coldest months, January and February.

The temperature varies from as much as 125° in shade during July and August to 20° at Baghdad, and as low as 5° at Mosul. Snow falls in Mesopotamia in December and January.

In Persia, Alpine conditions prevail, the cold is intense, and the roads are blocked with snow in mid-winter. In the Basra and Kurna districts the climate is very damp and hot in summer but pleasant in winter. Sand storms are common in the spring.

Iraq.

The land between the Tigris and Euphrates, a wilderness, sprinkled with camel thorn, and barren except at certain seasons,

when it is carpeted with herbage ; the only trees to be seen are the date palms, which are found where there is sufficient water, and a few willows.

The productive areas are confined to narrow belts of land adjoining rivers, canals, or marshes. In the Mosul area the rainfall is sufficient to produce ample pasture for flocks and herds, and the mountain streams provide a perennial water supply. In Persia grass is plentiful after rain.

Crops.

The crops for animal food are barley, maize, and millet. The barley is good, but all the grain is dirty ; it is threshed by being trodden out by cows and buffaloes.

Properly cleaned, the barley might compare with the best in the world.

The pasturage is nowhere permanent, except in the extreme north and in the vicinity of swamps and rivers. In bad years it is likely to fail altogether.

Roads.

Before the war there were no roads in Iraq, but the ground was usually passable for wheels. The going is often rough, and is very heavy after rain. The difficulties of movement are chiefly due to the desert and waterless character of most of the country.

Before the war the most northerly route for wheeled traffic was that leading from Mesopotamia across the Persian frontier, the Baghdad-Khanikin-Kermanshah route. With the exception of short stretches here and there, as on the Baghdad-Aleppo road, no road in Mesopotamia was metalled. During the war road-making was carried out on both sides of the Tigris and motor cars could travel from Basra to Baghdad, and also on other routes. Across the desert the going was pretty good, except after rain.

Before the war the road from Baghdad to Enzeli on the Caspian, via Kermanshah-Hamadan and Resht, was very bad ; now it can be traversed by motor car ; and Dunsterforce used it during the advance to Baku.

THE WORKING OF THE VETERINARY SERVICES.

FIRST PHASE.

The period of operations covered by this phase extends from the outbreak of hostilities in November, 1914, to October, 1916, the latter date being that on which the responsibility for the direction of the force was taken over from India by the War Office.

The 6th Poona Division was mobilised in October, 1914, with a complement of three officers, A.V.C., and the personnel of a field veterinary section. One brigade accompanied by a veterinary officer, Captain H. Stephenson, left India in the same month and lay off the island of Bahrein pending the declaration of war by Turkey.

In November the remainder of the division arrived at the Shatt-al-Arab, landed, reduced the fort of Fao, fought the action of Sahil, and entered Basra towards the end of November. The Turks had retreated up-river to Kurna, which was captured the following month. During February-April, 1915, the Turks concentrated a considerable force west of Shaiba, about twelve miles from Basra, but were expelled after the battle of Shaiba in April, 1915. Trouble then arose on the right flank, and a force was despatched to clear the country from Ahwaz to Bisaitin. An officer, A.V.C., was posted with each of the columns engaged in these operations. In April, 1915, the force was augmented by the arrival of the 10th Division and two more veterinary officers. In the summer of 1915, Nasiriya was captured and the Turks were pushed back up the Tigris beyond Amara, but as no animals were used, the transport being entirely by water, there is no veterinary interest attaching to these movements.

In the autumn of 1915 the objective of the force was the advance up the Tigris, and all the available cavalry, artillery, and transport units were despatched thither. These were in the veterinary charge of two officers. In September the Turks were defeated at Es Sinn. They were pursued up-river, and the action of Ctesiphon was fought, followed by the retreat to Kut. On December 1st, 1915, Kut was invested, two veterinary officers being in the garrison. During January, 1916, the 3rd and 7th Indian Divisions arrived from France, and the 13th Division came from Egypt in the early summer. From the investment of Kut for the rest of the period of this phase the operations of the force resolved themselves into repeated efforts to relieve that garrison. These were frustrated by the strength of the position held by the Turks in the narrow defile between the Tigris and the Sunnayyat marsh on the north. With the surrender of Kut, a young veterinary officer, Captain H. Stephenson, whose cheerful energy, resource and judgment had been a constant help from the beginning of the campaign throughout the siege, became a prisoner of war.

To give an adequate idea of the veterinary duties involved, this first phase may be divided into two parts, the first extending up to the arrival of the two Indian Divisions from France in January, 1916. During this period the salient features of the operations were manoeuvre movements from one extreme flank to the opposite extreme flank followed by an advance ; subsequent to this the general position may be described as one of stasis. There was an abundance of local activity, but the radius of movement was only a few miles.

The veterinary personnel, consisting of three officers and less than a hundred syces, was inadequate ; the equipment was meagre and antiquated, and there was a lack of transport. It will be realised how the arrival of the additional divisions was welcomed when it was found that their veterinary establishments were complete in personnel and supplied with the latest equipment. The veterinary establishments were models of efficiency and brought relief from that tension which is the concomitant of overwork.

At the end of November, 1914, all the A.V.C. personnel were concentrated with the force at Basra. The field hospital was camped in the old Turkish cavalry barracks under the command of Captain B. R. Body, A.V.C. This left Captain H. Stephenson and the A.D.V.S. free for executive and inspection work amongst units. In addition to these duties these two officers turned their attention to the animals of the local inhabitants. A few days sufficed to reveal that glanders, biliary fever, and epizootic lymphangitis were enzootic in Basra. This constituted a serious menace to the animals of the force, and it was obvious that immediate steps should be taken to combat it. Matters were represented to the political authorities, and with the approval and help of Sir Percy Cox the following sanitary duties were organised :—

- (a) All horses, mules, and donkeys were systematically and thoroughly inspected.
- (b) Any suspicious cases were despatched to a quarantine centre, and those ultimately declared infected were destroyed.
- (c) Fair, and even generous, compensation was paid to owners of destroyed animals.
- (d) Owners were invited, and the military police were ordered, to send animals suffering from wounds, galls, etc., to the veterinary hospital for free treatment. This was extended later to cases of sickness which were almost exclusively due to biliary fever.

These arrangements, coupled with the inspection and improvement of stables—which appeared to be sited and constructed with a view to excluding light and air—sufficed, with subsequent vigilance, to abolish a focus of contagious disease and to protect military animals in Basra from infection.

These measures demanded money and the confidence of the Arab owner. The first—and it was not a negligible amount—was forthcoming promptly from the political service ; the second was a plant of slower growth, but was assisted by the fact that a few Arab dealers (well known at Poona, in India, to some of the veterinary officers) were held up at Basra by hostilities ; these Arabs through the medium of the bazaar coffee-house spread abroad testimony as to the ability, reliability, and impeccability of the British officer in relation to horses. There were other means, too, by which this confidence was fostered.

Riding home late one January day a veterinary officer, accompanied by the Commissioner of Police (an accomplished Arab scholar), met far out in the desert a tearful Arab lad leading a limping white donkey of the famous Hasa breed. The pastern bone of the off fore leg was badly broken—a compound comminuted fracture. Enquiry elicited the fact that he had, while conveying melons from Barjesyah for sale in Basra, met a mule cart returning from Shaiba which by some mischance had run over his donkey with distressing results. The evidence was accepted, and a few words on the leaf of

a note-book empowered the owner to claim a sum of money adequate to his loss. The money was paid on the third day following, and the incident, published by the grateful owner, received the approval of the bazaar.

The outcome of these influences was an extensive free clinic at the hospital, whereby the lot of the pony in the public conveyance was rendered easier, and a means of detecting and controlling disease was put in our hands.

The entire force was not long located at Basra. The Turks, after being defeated at Sahil in November, retreated up-river to Kurna. In January, 1915, Kurna was captured and was held by a mixed force, with Captain Stephenson in veterinary charge. He was given a few syces and the necessary drugs and appliances to form a small hospital. In February and March the Turks threatened Basra from the left flank, having taken up a position on the Nakhaila Ridge beyond Shaiba, which is ten miles S.W. of Basra. The remainder of the force which included a brigade of cavalry and artillery was concentrated at Shaiba, and Captain Body with a nucleus of personnel and stores was placed in veterinary charge. The veterinary hospital in Basra was thus left without an officer and in charge of a British subordinate. In the middle of April, after a three days' battle, the Turks were driven from their position and retreated northwards to the Euphrates.

It should here be mentioned what the difficulties were of supplying the force at Shaiba, which was but such a short distance away from the base. Between the Zobeir Gate of Basra and the ridge of Shaiba lies the desert, affording in normal circumstances good going for every kind of transport. On the morning of February 8th the water of the flooded Euphrates swept across this space, seeking an outlet to the Persian Gulf by way of the Khor Abdullah. There it massed and stayed—an inland sea eight miles wide, in some places 6 feet deep and nowhere less than knee-deep, making Basra an island. A track was charted across this flood, and daily the mules bore their burdens to the troops on the farther shore.

The cavalry brigade at Shaiba had many casualties in animals, and it was necessary to try to replace them. There was no remount officer or personnel with the force, and it devolved on the veterinary staff to act in this capacity. It is of no professional interest to recount the exacting labours in this connection, but it should be recorded that remount duties were performed by the A.V.C. from November 1914 till December 1915. This involved the establishment of a remount depot with such personnel as could be procured anyhow and anywhere; the reception and issue of hundreds of horses received from overseas, discharged from hospitals, those captured from the enemy, and those the property of officers who had become casualties which had to be valued and paid for; the purchase of horses locally and in those regions of Persia within reach. On the arrival of the two divisions from France—December and January, 1915–16—the A.V.C., in addition to its own duties, was responsible for remounts

and had charge of the Base Cavalry Depot, whence was despatched the first echelon of 250 men and horses under the command of Major E. C. Orton, A.V.C., to march to Shaik Saad to reinforce the Tigris Army Corps.

At the date of the battle of Shaiba the 10th Division arrived, and, after the Turks had been driven back to the Euphrates and the left flank cleared, this division crossed the Shatt-al-Arab and marched to Ahwaz on the Karun River. Thence it operated in the direction of Bisaitin to disperse hostile elements which threatened the right flank.

Captain H. Stephenson was withdrawn from Kurna and given veterinary charge of this division, being helped by a British shoeing-smith and ten syces. With this meagre assistance, he dealt with the casualties of the division, the captured animals, an outbreak of anthrax among horses and mules, and a disastrous outbreak of surra which destroyed a Camel Corps. He marched back to Basra, arriving in September; the division came back by water in July and proceeded to Nasiriya on the Euphrates. As no animals were taken, no veterinary officer was necessary, a fortunate circumstance as none was available. While the 10th Division was thus engaged, the 6th Division returned from Shaiba and proceeded up the Tigris, pushing the Turks before it. It was transported entirely by water, like the 10th Division at Nasiriya, and for the same reasons a veterinary officer was not sent with it.

Captain Body returned to Basra and resumed command of the hospital. He was invalided during the summer and Major Probyn arrived from India in relief.

During the summer of 1915, Nasiriya was taken and garrisoned. The 6th Division advanced steadily on the Tigris. Amara was taken, and in September the Turks were defeated at Es Sinn and Kut was occupied. Thereafter the interests of the force lay up the Tigris with Baghdad as the objective. As transport became available during the summer, mounted troops and mule transport were sent up river to join the 6th Division. Captain Stephenson, as soon as he returned from Ahwaz, was sent to Kut, where the division then was, to take veterinary charge. Shortly after, in the second week in October, Captain Farebrother arrived from India and was at once sent in charge of a barge-load of remounts to join the force. During October and November the 6th Division advanced from Kut to Ctesiphon, retreated to Kut and there its military activities terminated in a result which is now historical.

The cavalry brigade marched down river to Ali Gharbi; the rest of the force, with Captains Stephenson and Farebrother, remained at Kut. There is very little of veterinary interest attaching to the Kut-Ctesiphon phase of operations. As the advance was dependent on the supplies carried by water transport, which had to overcome a five-knot adverse current, it was normal in rate of progress, so that the animals were not taxed beyond their resources. Ctesiphon, being an infantry battle, caused few casualties among animals.

The same may be said of the retreat, which was naturally made at a faster rate than the advance, and the mounted units were more actively employed, while as regards the river transport the current was not inhibitive. But, being disciplined and methodical, it was only made at the speed of marching infantry, and the animal casualties were consequently negligible.

Behind the fighting front two more field veterinary sections had arrived. One was sent to Amara on the Tigris, the other was located at Nasiriya.

We now approach the line of cleavage when the Indian divisions arrived from France in December and January, 1915-16, and an outline of the situation in the first week of December, 1915, may usefully be given.

The right flank at Ahwaz was quiet and was held by a small force, including a cavalry regiment. Veterinary interests were looked after regimentally, and as there was little activity casualties were few. The left flank at Shaiba was also quiet. It included an Imperial Service cavalry regiment and was visited periodically from Basra by veterinary officers. Soon after its arrival, glanders was discovered in the Imperial Service cavalry regiment; the animals were tested with mallein and twelve reacted. The regiment was again tested and there was no further trouble.

The Euphrates line was held by a brigade at Nasiriya with detachments at Suk-es-Shiowykh and Hakika. A veterinary hospital was located there and dealt principally with the casualties of two cavalry regiments, the mule and local camel transport. There was much activity on this front—chiefly due to the energy of Ajaimi, who was perhaps the only purely military genius among the Arabs during the war. This activity kept the veterinary hospital busy.

On the Tigris, Amara had assumed considerable importance. It was a kind of half-way house between base and front and hospitals; depots and stores were located there. The veterinary hospital was essential; it met the needs of the garrison and of troops passing through to the front. Later it also admitted casualties sent down by the empty tugs from the front. Farther up the Tigris lay the centre of gravity of the force—the beleagured 6th Division in Kut. At Ali Gharbi was encamped the cavalry brigade which had been sent down river when the division remained at Kut.

At the base the animal population grew apace. Units arrived from India and were camped in an ever-increasing ambit from the point of disembarkation at Ashar. The site of the veterinary hospital was required for purposes connected with the preparation and repair of river transport which was now being rapidly augmented. It was therefore moved to the fringe of the palms on the edge of the desert. It was foreseen that with the increase in the army a very much bigger base hospital would be necessary, and steps were taken to obtain another field veterinary section from India. A base depot of veterinary stores had been formed as part of the hospital—an improvised arrangement to meet the demands of units. Its

equipment consisted mainly up to this date of what are known in India as "veterinary stores for the voyage" taken off animal transport ships. The veterinary stores taken from the ships and the instruments in the Indian veterinary chests formed a serviceable combination until the arrival of the English equipment.

Hitherto the veterinary service had suffered from paucity of officers and lack of equipment. This had been represented to the War Office and, with the arrival of the additional divisions, these defects ceased. These divisions arrived complete in personnel and equipment. Unit chests requisitioned from England were also received. Remount duties were taken over by remount officers from India. The cavalry base depot was merged in the base depot in process of being formed. For the first time the A.V.C. were concerned only with purely veterinary duties. A base depot of veterinary stores arrived and was located at the base hospital. A field hospital from India was established at Sheik Saad, within easy reach of the fighting line, and an advance store depot was attached to it. Another field hospital from India was allotted to the base. This made it possible to deal efficiently with the growing needs of the base. A convalescent horse depot on a big scale was constructed on the other side of the river. It was not conveniently placed as it meant the requisitioning of river transport every time animals were sent over, but space and water were not procurable on the Basra side and in practice the arrangement was found to be satisfactory.

Lastly, and most important, there were officers and personnel available for these additions to our service.

During the first four months of 1916 the utmost endeavours of the army were directed to the relief of Kut. Kut fell on April 29th, and thereafter activity was suspended, to be resumed the following autumn with ampler resources, wider outlook, patience and success.

During the period under review the only means of transport was by water, as the railway was only in its initial stage. This would have been a handicap merely in point of time if the amount of small water carriage at our disposal had been sufficient. A few barges and tugs were all that were available for the landing of troops, animals, and supplies. Ships could not be brought alongside a wharf or jetty; the animals had to be slung in mid-stream into barges loaded with bales of bhoosa, towed to the river shore and then landed by improvised ramps.

This was a slow process, but it was the only one, and it is, on reflection, amazing how few were the casualties. With the advance up the Tigris, tugs and small craft became scarcer at the base, as the troops up-river had to be supplied.

The only method of transporting by water was by lashing a barge to each side of the paddle boat, and on these barges men, animals, and supplies were carried to the front. Progress was slow against the stream and somewhat hazardous on the return journey as the Tigris flows at the rate of five knots and has very many sharp bends. Also

it has to be remembered that when the floods subside after the middle of the summer the depth of water is variable and insufficient in places, so that boats would often be aground for three or four days. The Tigris army corps actually were short of supplies from this cause in August, 1916.

Subject to the state of the river and the transport available, it was comparatively easy to evacuate animal casualties from the front to hospitals on the line of communications. The boats and barges came back empty, and it was a simple matter to walk animals on to them and take them off again to hospital. Delay often occurred in thus transporting animals down stream, but it never had serious results. Gradually, as the force gained recognition, more water carriage arrived—river steamers from the Irrawaddy, the Nile, and the Thames, dredgers, tugs, barges, motor launches—and finally the completion of the railway put an end to the handicap of want of transport. Wharfs and jetties rapidly extended for miles along the river front, and ocean-going ships tied up alongside these to discharge their loads. It took many days to *sling* a mule corps into barges ; it took fewer hours to walk it ashore.

A journey to Nasiriya in July, 1916, entailed eight days, three of which were spent aground in the vast expanse of the Hamar Lake in a temperature of 123°, under exposure to the nightly attentions of the malevolent marsh Arabs ; in April, 1917, it was possible to leave Basra after dinner in the night mail and to breakfast next day at Nasiriya.

The disposal of carcasses became an urgent matter as soon as Basra was occupied. At first, the procedure adopted was to consign them to the river, but as they were usually washed ashore near Mohammerah and Abadan, this was objected to by the representatives of the Anglo-Persian Oil Co., and other means of disposal had to be sought. To burn the carcasses was not practicable, as all firewood had to be imported from India. There remained the alternative of burial. The reason why this was not adopted from the beginning, as the desert was so close at hand, lay in the fact that the desert is only a few feet above the river level when the tide is at the ebb. During high tide the desert is only a few inches above river level, and it was, in fact, submerged when the Euphrates was in flood in February, 1915. High ground, that is, ground a few feet above the level of the desert, had therefore to be found for the purposes of burial. This was very difficult and was always a cause of anxiety.

This restriction of space due to the encroachment of water had another effect. Local resources were drawn on to supplement meat supplies, and cattle and sheep were bought in excessive numbers. These animals came from the Euphrates, and had never been penned or grain-fed. On arrival at Basra they were massed in kraals wherever dry footing could be found, fed on a grain ration, and not moved off their standings for weeks. They pined in condition, contracted a chronic enteritis, and those that did not die from disease became worthless for meat.

The paucity of veterinary officers before 1916 was a cause of considerable loss. It was necessary to buy mules, and a supply and transport officer was sent to Dizful in Persia to find as many as possible. About 400 came to Basra, but it was obvious at a glance that the majority were too young and undeveloped for work. Examination of their mouths revealed that more than half were two years old; the temporary teeth had been mistaken for permanent. Similarly, fifty ponies were bought on the Tigris, and all of these proved to be two years old. Two hundred camels were bought at Koweï; the majority were in an advanced stage of pregnancy, the remainder had sore backs.

For this period of the campaign—November, 1914, to October, 1916—no veterinary statistics of any kind are available as no returns were rendered. While the force was under the direction of the Government of India, it was decided that owing to the shortage of officers and personnel any returns that could be compiled would be incomplete and would convey misleading information. This decision considerably lightened the lot of the veterinary officer. At the same time, although no figures can be adduced in proof, it may be stated with confidence that the sick rate was a low one.

The incidence of disease was highest at the base. Every animal arriving for the force was disembarked there, and on the officers at Basra was imposed the necessity for constant vigilance, hard work, accurate diagnosis, and instant action.

It should be emphasised that the organization of the Army Veterinary Corps in India at the outbreak of war was much inferior to that at home. Its personnel consisted only of officers and a few N.C.Os. Its equipment was the veterinary chest, which was cumbersome and impracticable for field service. The veterinary hospitals in peace maintained the equipment only of the veterinary hospital for war; its personnel joined on mobilisation and was untrained in even elementary veterinary duties. Thus when a field veterinary section came into existence two individuals only, the officer commanding and the British N.C.O., were in possession of knowledge and experience in the treatment of disease. Furthermore, in peace the A.V.C. had veterinary charge of British troops only; Indian troops were looked after by Indian veterinary graduates, and the A.V.C. had no concern in them except on the outbreak of contagious disease. In war all animals came under the charge of the A.V.C.

Therefore, at the very outset of operations, the veterinary service had to extend its responsibilities to include units with which it had little or no previous contact, and to mould into coherent entity the varied elements placed at its disposal.

In addition, the fact that three divisions which came from France and Egypt during the winter of 1915-16 had mobile veterinary sections which had no place in the Indian organization, gave rise to considerable diversity of systems.

The inspection of units on mobilization in India revealed the fact that many of their animals were affected with long standing

contagious diseases that should have been eradicated long before, and this would certainly have been done had the knowledge and experience of the corps been concentrated on it. In the neighbourhood of Poona in October, 1914, there were squadrons, sections, and troops of Indian formations in segregation for contagious disease which had been discovered at Bombay on inspection prior to embarkation. This fact, apart from its potentialities for the dissemination of disease, caused serious dislocation in the composition and interior economy of mobilized units. The disease was glanders, than which there is none easier of control; and it was this disease which was encountered in Mesopotamia and exclusively in units of the Indian Army and of Native States.

Undoubtedly the disease of highest incidence in Mesopotamia during this period was piroplasmosis—the biliary fever of India. It appeared first in March, 1915, at the base, when biting flies became active with warmer weather, and recurred every spring and summer.

No case of secondary infection was noted, and there are grounds for concluding that one attack confers immunity. It had been observed that in India, where the disease is well known, few Arab horses were attacked, and the same might be said of the Indian country-bred horses. The explanation of this is possibly that these breeds contract the disease in early life and are thereafter immune. With regard to the Arab horse, it is certain that this is the case. Scores of cases were met with in Mesopotamia and entirely among young stock. The sheiks look for it every summer along the river banks, and they expect all their yearlings to be affected. From actual acquaintance with the facts it can be asserted that this was the situation among the Beni Lam tribe in June, 1916.

It was said that deaths were few, that treatment consisted in leaving the cases alone, and that as a rule recovery was complete in three or four weeks.

It was some time before the definite conclusion was reached that we were dealing with biliary fever. Long and frequent examination of blood smears under the microscope was necessary. This, of course, afforded conclusive evidence, but, as the process took such a long time, search was made for some clinical symptoms which experience showed to be associated with, if not expressive of, the disease. The disease appeared in two forms—acute and sub-acute or chronic.

In the acute form there was high fever and a blotched, conjunctival membrane. These cases were easy of diagnosis and never escaped detection.

The sub-acute cases were difficult. There was no fever, often the temperature was sub-normal. The conjunctival membrane was perhaps a little paler than normal and a few small petechiae were seen on it. The general appearance was one of exhaustion or debility, tucked up flank, without response or reflex. Horses in this state would lie down at night and be found dead in the morning without any sign of a struggle.

Obviously this was a source of wastage of grave significance, and the absence of symptoms was an obstacle to timely action. As it was also believed that one attack conferred immunity, it was doubly important that the disease should be treated at the base, where facilities existed, and not allowed to run a chronic course with the attendant risk, in mild cases, of affected animals being sent up-river to succumb to the demands of field service. Careful observation finally led to the conclusion that the petechiae on the conjunctiva associated with malaise must be regarded as pathognomonic of this form of biliary fever. Hitherto the treatment of this disease had proved of little avail and was directed to combat hepatic disorder. It had little effect on the issue of the case, which apparently rested on the degree of infection and the powers of resistance of the subject. Our experience was no better until the advice and help of Lieut.-Colonel A. J. Williams was obtained. This officer had seen much of the disease and a brochure written by him covered the entire subject and included treatment (*see* page 336). Under his direction what came to be known as the biliary fever outfit was prepared in India and sent to Mesopotamia.

Briefly, the outfit may be described as an apparatus for the intravenous injection of one dram of quinine hydrobromide dissolved in an ounce of water. This treatment was a specific, it failed only when the disease was not detected and treated in its early stages. Its application demanded care and practice. There were occasions when phlebitis followed an injection and the jugular vein was occluded, but experience gave confidence, and the attitude adopted towards the disease and its treatment may be inferred from the phrase then current: "When in doubt, inject."

Few cases occurred up-river. Basra, with its palms and vegetation fed by tidal waters, and its humid heat, was the chief locality where infection occurred; and there the efficiency of the army in this respect had to be safeguarded.

Glanders.—As has been already related, this disease was discovered immediately to be rife among local animals in Basra. This was surprising as the Arab horse, as known in India, is a particularly healthy animal, and outside Basra he was found to be the same. Horses bought in the country and those captured from the enemy—and these amounted to a few hundreds—were never found to be affected; the blame must therefore be laid on the dark fetid stables of Basra.

Two years or so after the British occupation began the export of Arab horses to India was resumed. They walked vast distances to Basra for shipment, and it was noticed that while awaiting embarkation they were always camped in some palm grove outside the city—never within it. The Arab dealers were well aware of the risk of infection.

The first case of glanders discovered in the army was in March, 1916, in a charger the property of a cavalry officer. It was a clinical case and it reacted to mallein. As it had only been landed the same

day and had not been in contact with other animals, there being no other animals on the ship, no further trouble arose. Thereafter sporadic cases were met with, and once, in a ship-load of remounts, two horses were found affected. The biggest outbreak was that previously mentioned as occurring at Shaiba, in a cavalry regiment of the Indian State Forces. It was eradicated by means of the mallein test.

Thus in two years less than twenty cases of glanders occurred, a result eminently creditable to the veterinary examination in India of animals embarked for Mesopotamia, which would have been still better had the A.V.C. had charge of Indian units in peace.

Anthrax.—There were two outbreaks of this disease; the first among the cavalry units and mule corps which returned to Basra from the Ahwaz flank in September, 1915; the other in May, 1916, among a detachment on the Tigris near Ali Gharbi. With regard to the first outbreak, the column marched up the rivers to Basra, and the first case occurred at one stage short of that place. On arrival there were two more cases. Captain Stephenson, who accompanied the column, attributed the outbreak to the water and grass of a muddy creek a few marches out. The animals were watched at every feed time and any not feeding were at once moved into isolation. This was the only measure taken. Two more horses died, and the period of incubation, calculated from the assumed day of infection, having terminated, the units were declared free. They proceeded to the front, and no other case was reported.

The second outbreak was suppressed by the moving of the camp; only three cases occurred.

Foot-and-mouth Disease.—This does not seem to be enzootic in Mesopotamia. It occurred among bullock transport from India, pursuing a vagrant course, one beast being affected while its neighbour escaped. It was always of a mild type and gave little trouble.

Surra.—Early in the campaign some 400 camels of the Bhawalpur Camel Corps were sent out to Mesopotamia. They were not required at the time as all transport was carried out by water. They were sent to Ahwaz on the Karum river in the summer of 1915. Disease broke out amongst them in a most virulent form and destroyed them all in a few weeks. The duration of the cases averaged about three and a half days. None of the twelve ponies attached to the corps was affected. This disease was diagnosed as surra,* but owing to the conditions which existed, and to the fact that there was no veterinary bacteriological laboratory available, it was impossible to confirm this diagnosis.

Twelve months afterwards camels were again used extensively, but they were animals of Arabian breed and the disease ran the usual chronic course of progressive debility; when an animal was deemed useless for transport it was destroyed.

* In the existing state of veterinary knowledge the diagnosis of surra cannot be admitted in respect of cases of which the average duration is stated to have been three and a half days. (Editors).

The Arabs attribute surra to a gadfly of the family *Tabanidae* which occurs along the Euphrates ; the fly belt is known and avoided in the summer.

Mange.—Only camels were affected with mange. In these animals it was rife and caused considerable trouble. The Arabs have a very effective way of dealing with the disease. In the spring, when the thick winter coat is beginning to be shed, the camel is covered entirely with a thick mixture of quick-lime and some arsenic compound, probably yellow oxide. This is allowed to remain for three days, it is then removed, bringing the hair with it, and the camel becomes a glistening, glabrous mass, free from mange.

Epizootic Lymphangitis.—This insidious disease was first observed in December, 1914, among the local ponies in Basra, but it was not reported among military horses until the spring of 1916, when a suspected case was destroyed in the Tigris Army Corps at Orah. But this exemption was not long enjoyed ; with the arrival of large numbers of remount horses and mules from India cases became numerous.

Influenza.—This disease was introduced by horses from India in the autumn of 1915. It was of a mild type and caused no casualties. It is curious that in one regiment, the 16th Cavalry, in which it appeared, only one squadron was affected.

Pneumonia.—Appeared among the horses of an Indian cavalry regiment on their arrival from France. Though extensive in this regiment, a third of the horses were affected, it did not spread to other units, and there were no deaths.

Other Diseases.—It was so seldom necessary to look at an animal's foot in Mesopotamia that it was a matter of surprise when nearly thirty cases of canker were encountered among remounts which came from India during the winter of 1915-16. A few had to be destroyed ; in the others the disease was not progressive, and as they remained sound after treatment they were serviceable. How and where the disease arose is an obscure point. It is certain that it was not contracted in Mesopotamia as cases were discovered immediately after disembarkation. India, when the matter was reported, disclaimed responsibility, and when cases ceased with the advent of the summer interest in the origination of the disease lapsed.

There were eight cases of what can only be called heat stroke among horses of the 13th Hussars. The regiment arrived from France in the very hot weather of July, 1916. Two or three days after landing these horses developed symptoms of paralysis and rapidly succumbed.

Four matters of general interest to the clinician may be mentioned :—

- (a) During the operations culminating in the battle of Shaiba, in April, 1915, cavalry were extensively employed and casualties among horses were numerous. Some five or six horses were shot through the trachea—the larynx was not touched. The external wounds healed in a short

time and complications were not anticipated, but gradually difficulty of respiration was noticed and the animals became useless from stenosis of the trachea.

- (b) During an inspection of animals on board a transport three horses were noticed to have swellings on the near jugular furrow and to be salivating. These injuries were apparently of recent origin as they had not been reported. On the animals being taken to hospital and examined, the oesophagus in each case was found to be ruptured. These horses had been bitten by their neighbours and the unusual result points to the advisability of securing horses' heads on transports.
- (c) One squadron of the 33rd Cavalry was landed to form part of the force engaged at Sahil in November, 1914. That day the horses only marched to camp a very short distance away. On the same evening they all stampeded. Very few were recovered as the force moved on at dawn.

The lesson to be derived from this incident is that horses which have been cooped up in a train or on board ship are very liable to stampede if picketed out in the open ; every possible means should be taken to prevent this happening.

- (d) A safe and effective method of inducing general anaesthesia was practised at the base hospital. One ounce of chloral hydrate in 5 ounces of water was administered intravenously. Complete insensibility followed, lasting from five to six hours. This latter feature constituted an objection as it meant that the patient had to be kept under surveillance, which was not always practicable.

5. Such is an outline of the endeavours of the A.V.C. for two years in Mesopotamia. The shortage of officers and personnel and the inadequacy of equipment were not peculiar to this corps ; every unit in the force suffered in a similar manner.

SECOND PHASE.

From the Autumn of 1916 to the Armistice.

Concentration for the Advance on Baghdad.

During the period of suspended activity which followed the fall of Kut steps were taken to complete the reorganization and expansion of the veterinary services to meet the ever-growing needs of the force which was concentrating in readiness for operations to be resumed in the autumn.

During December, 1916, all formations on the lines of communication marched up-country to a concentration area, up-stream from Sheikh Saad. Continuous rain was experienced between December 10th and 12th, and the movement of the troops was much impeded by the heavy state of the ground ; many cases of ruptured muscles

and fractured limbs occurred among the camels due to slipping on the greasy roads. About 3,000 camels had to be withdrawn, and only pack mules were at work in conveying supplies. The concentration of troops for the advance of Shatt El-Hai was complete on December 13th, and the force, including a cavalry division, moved forward at 5 p.m. for a long night march to the river Hai, which they reached at dawn on the 14th.

The mobile veterinary section of the 7th Cavalry Brigade accompanied the division throughout the operations and efficiently cleared the casualties of the 6th and 7th Cavalry Brigades.

The mobile veterinary sections of two infantry divisions, located at railhead of the military light railway, received the casualties from the cavalry divisions and conducted them to the receiving veterinary hospital at Sheikh Saad. When these sections moved forward arrangements were made to collect the sick from all formations at railhead and conduct them to the advanced base veterinary hospital.

The Advance to and Occupation of Baghdad.

The cavalry had to advance over a plain without cover of any kind, and the casualties from shell fire among the horses were considerable. Throughout the operations it was only possible to water the horses once daily as they refused to drink at dawn. Consequently, with the exception of one squadron, the horses of the 7th Cavalry Brigade had no water from the evening of the 19th until 11 a.m. on December 21st; during this time they covered 70 miles. Full forage rations were issued throughout, and, in spite of the hardships, the majority of the horses maintained their condition and the proportion of sore backs was not excessive. The use of a second saddle blanket prevented saddle injuries.

During the last week in December the cold was severe, and the daily heavy rain storms rendered the whole country impassable: the convoy mules became exhausted from working all day in the mud, and until conditions improved their loads had to be reduced by half and a system of short stages not exceeding three miles had to be introduced. The combined influence of bad weather and a shortage of fodder caused the animals to lose condition. Camels could not be used with any degree of safety, and many cases of fatal injury occurred after the first few hours' rain. Owing to these difficulties of transport the forage of the horses and mules of the field formations, except those of the cavalry division and units based directly on the river, had to be reduced by 25 per cent.

A large number of syces fell sick during the first spell of cold weather, and in framing estimates for future reinforcements this fact was kept in view, especially as there was every prospect of a far greater proportion of casualties a few months later, during the unhealthy season. To meet these prospective demands the veterinary authorities in India arranged for a large number of syces to be placed under training in the veterinary hospitals in India.

The fact that animals cannot maintain their condition unless they receive sufficient bulky food was seen in the cavalry division on the march to and occupation of Hai Town. Although an ample supply of crushed barley was then available, it was not possible to obtain more than 2 lb. of bhoosa daily, and 30 per cent. of the Australian horses lost condition in a marked degree after being eight days away from standing camp.

At this period a high proportion of cavalry horses evacuated from the front to the receiving veterinary hospital were suffering from sore backs, chiefly due to loss of condition, caused by continuous work and the want of a balanced ration.

The chief causes of inefficiency from the time operations were resumed up to the end of December, 1916, were as follows:—

	<i>Per cent. of Casualties</i>
Shell and bullet wounds	8
Sore backs	12
Sprains	15
Exhaustion and debility	65

During the operations of the cavalry division from February 1st to 15th, 1917, sixty horses were killed or destroyed for shell wounds and 11·05 per cent. were inefficient at the end of the period. Only ten cases of colic were reported in the whole force among over 55,000 horses and mules, in spite of the irregular nature of the watering and feeding and the fact that bhoosa (the commonest cause of colic in over-fatigued animals) was largely supplied.

During the last week of February, 1917, in view of an advance on Baghdad, all unserviceable animals were withdrawn to the receiving veterinary hospital at the advanced base, Sheikh Saad. No. 5 Mobile Veterinary Section was pushed forward from the advanced base to join the 6th Cavalry Brigade, but owing to the shortage of transport it was delayed and failed to reach the brigade before it crossed the Tigris at Shumran on February 24th; this, however, fitted in with the developing battle. The cavalry division suffered rather heavily in horse casualties; these were evacuated to No. 5 Mobile Veterinary Section, which was still on the right bank, the division pushing on to Inam Mahdi at 5 a.m. on the 25th.

The Mobile Veterinary Sections of the 3rd, 13th, and 14th Divisions crossed at Shumran bridge on the 26th and 27th, and No. 2 Mobile Veterinary Section accompanied the 7th Division, advancing on the left bank, after clearing the Sanniyat and Suwada positions.

On the 26th the cavalry division bivouacked at 1.45 a.m., having had practically no water for the horses all the previous day. At 7 a.m. they continued the pursuit beyond Baghailah and bivouacked at 1 a.m. on the 27th without rations for men or horses.

The Turkish army was now in full flight, and the pursuit was resumed at 2 a.m.; the horses had only a very small feed before

starting, leaving about 2 lb. of grain in the nose-bags. The condition of the horses was such that the A.D.V.S. considered that they could not cover more than fifteen to twenty miles at a slow pace, and then more food would be absolutely essential. This opinion was communicated to the army commander by wireless.

The 7th Cavalry Brigade continued the pursuit along the river bank with the 6th Brigade on the right flank, and after they had proceeded a short distance two grain barges were captured which enabled the 7th Brigade (less the 14th Lancers who had accompanied the 6th Brigade) to fill up their nose-bags. The 7th Brigade halted three miles down stream from Aziziyah, while the 6th Brigade pursued the enemy to Aziziyah and engaged his rearguard before nightfall : all day they had practically no grain and very little water ; they covered, however, about thirty-five miles.

On the 28th the cavalry division discontinued the pursuit and moved a short distance down-stream. The horses of the 7th Brigade were fairly fit, but those of the 6th Brigade were much exhausted and in need of rest.

On March 1st and 2nd an inspection of the horses was carried out by the British veterinary officers, and sixty-five were handed over to No. 4 Mobile Veterinary Section for evacuation to Sheikh Saad by the first available barge. On March 3rd and 4th reconnaissances were carried out, but the division remained at Aziziyah, which was then the advanced base.

On March 5th, at 6 a.m., the 7th Brigade continued the pursuit, after handing over all sick and wounded animals to the mobile veterinary section. The enemy were encountered at Lajj in a strongly entrenched position which the 13th Hussars charged, losing sixty horses. The Brigade returned to camp at 12.45 p.m.

On March 6th and 7th the cavalry division carried out long reconnaissances towards the Dialah river. On March 8th the whole of the cavalry division moved out at 1.15 p.m. to cross the Tigris from the left to the right bank. At 6 p.m. the crossing was completed and the division marched throughout the night. At dawn on March 9th the division was in sight of Baghdad, with a strongly held position in front of it, and a halt was made to allow the infantry division to come up. The day was very hot and at noon the A.D.V.S. informed the G.O.C. that it was imperative to water the horses in order to save heavy losses as they had not been watered for twenty-six hours. It was necessary to march eight miles before a suitable watering place could be found ; several horses died from exhaustion or were destroyed on the way, and a few were killed by snipers on the opposite bank of the river.

On March 10th the division moved off at 4 a.m. and had to march six miles to water ; both brigades carried out a long reconnaissance during the day and bivouacked at 2.30 a.m. on the 11th.

The 11th was a very trying day ; a high wind prevailed all day, culminating with a terrific dust storm during a night march to water. At 5 a.m. the horses were again on the move, having had insufficient

time to eat their hay during the short rest. The division reached Baghdad before noon on March 10th, the 6th Brigade going on to Kazamain, the extreme limit of the pursuit.

On March 12th and 13th a veterinary inspection of all animals in the division was carried out, with the result that 290 sick were collected by the mobile veterinary sections and evacuated to an improvised hospital which was formed at the advanced base area pending the arrival of field veterinary sections and the formation of the advanced base veterinary hospital. The mobile veterinary sections did excellent work under trying conditions; all difficulties were overcome and units were relieved of all inefficient animals.

A site for the veterinary hospital and advanced depot of veterinary stores was selected among large palm groves on the right bank of the Tigris adjacent to the supply depot; construction was started immediately and was carried out by the native personnel of veterinary units, no outside help being available and there being little material except Mesopotamian mud.

In May one field veterinary section arrived from Sheikh Saad, took over 700 sick which had been temporarily provided for and continued the construction of the hospital. Horse tents arrived from India and proved invaluable, as the only material available for the construction of shelters was palm matting.

The completion of railway communication between Nasiriya and Basra set free the field veterinary section at Nasiriya, which was moved up to Baghdad, being replaced by a veterinary detachment equipped on the scale of a mobile veterinary section to deal with the sick at Nasiriya and superintend evacuations to the base veterinary hospital by rail.

By June four field veterinary sections had arrived at Baghdad, and the veterinary hospital was extended to accommodate 1,250 animals. The organization and working of the hospital followed the general principles adopted for the working of veterinary hospitals. As, however, it was a mixed establishment of British and Indian personnel, certain modifications were necessary as work had to be done which would not occur in home hospitals.

The animal casualty returns furnished by the cavalry division, covering the period of the pursuit from February 24th to March 11th, showed a loss of 7 per cent. of horses dead, destroyed, or missing, of which 2 per cent. were from battle casualties and 4 per cent. from exhaustion. The mortality from exhaustion was attributable to long hours under the saddle, shortage of water, and insufficient time for rest and feeding.

Contagious disease was prevalent among the animals of the civil population in Baghdad, and in order to safeguard the animals of the force veterinary inspections were carried out and authority obtained to adopt the necessary measures for its control. Donkeys and ponies working in the streets were found to be suffering from large suppurating sores and incurable injuries, causing great pain. This cruelty was represented to the military governor, who arranged to have all

the animals in question seized by the police and those condemned by a veterinary officer destroyed.

Operations North and West of Baghdad.

After the occupation of Baghdad the force was divided into two columns, operating up the Tigris front to the Dialah and the Euphrates respectively.

Evacuation by river was impossible as no barges were available. Consequently this had to be carried out by road. Owing to the great heat, the mobile veterinary sections found the work very trying. The columns engaged on the Tigris, Euphrates, and Dialah rivers concluded active operations early in May. Subsequently the cavalry was employed on punitive expeditions against hostile Arabs before returning to standing camps.

At the conclusion of these operations 956 animals were evacuated to the advanced base veterinary hospital, Baghdad. Of these it was estimated that about 85 per cent. would become serviceable and fit for transfer to remounts for re-issue in from two to three months.

The sick rate amongst horses and mules remained high during June and July. This was due to a large number of animals becoming debilitated after being attacked by piroplasmosis, their recuperation being retarded by the great heat and the absence of any kind of green food. The importance of frequent watering and keeping animals as far as possible in the shade was impressed on all units, and the movement of sick animals during the heat of the day was prohibited.

The general watering arrangements were satisfactory, but some units were situated too far from the river to water their animals four times a day. A shade temperature of 122·8° F. was recorded in July, and where water was not conveyed to within a convenient distance of the lines, the animals were unable to get all the water they required, and a marked loss of condition resulted.

To ensure that animals were watered regularly during such exceptional climatic conditions it was essential to convey an ample supply of water to the lines. This was eventually accomplished by using oil and hand pumps to raise water into surface channels running to the horse lines. During the exceptionally hot weather it was a physical impossibility to water animals four times a day when camps were situated over a mile from water. Many cases of heat stroke were recorded among horses, bullocks, and camels.

The provision of a suitable ration during the hot weather, and the issue of bran up to 2 lb. daily in lieu of grain, and the substitution of green for dry fodder up to 9 lb. a horse daily was recommended, but unfortunately shortage of tonnage would not allow of an extra issue of bran.

Millet stalks were tried as green fodder, but few animals would eat them, and, if given as chop mixed with the grain, the majority of animals refused their feed. An issue of young maize stalks and green barley was therefore made as far as the supply situation permitted. In order to maintain animals in condition during the hot

weather full advantage was taken of any available grazing ; in addition, green crops were cultivated in the vicinity of standing camps, as the value of kasil cannot be over estimated as a restorative for over-fatigued horses. Oat and barley kasil, and lucerne, were cultivated at all veterinary hospitals and veterinary convalescent depots.

During the summer halts the mobile veterinary sections were well situated for shade and water, mat shelters were erected or horse tents were issued on loan for the accommodation of cases of pyrexia, etc., until they became fit enough to be evacuated to veterinary hospitals.

In 1918 the force was well served with railways ; sick animals were evacuated from the front to five different railheads, all lines converging on the receiving veterinary hospital at Baghdad, where a special siding was constructed for detraining animals. The distance from the front to the various railheads did not exceed forty miles, with supply depots and rest camps at intervals of ten to twelve miles. During active operations, when the number of animals to be evacuated was abnormal, a conducting party from the advanced veterinary hospital was despatched to railhead in order to relieve the mobile veterinary sections of sick and enable them to return to the front with the least possible delay ; in some cases a veterinary detachment was located at a central point between the front and the railhead. Large quantities of barley and bhoosa were now available in the country, and large areas were cultivated by the Grass Farm Department, and also by units when in standing camps. This greatly relieved the supply situation.

Prior to the construction of railways the force had to rely on river transport for supplies, but as railways gradually appeared, connecting Basra with Nasiriya and Baghdad, Baghdad with the Euphrates valley, northwards towards Mosul, and north-east to the Persian frontier, the improvement in the general situation as compared with pre-railway days was very considerable.

The general health of the animals was now good, and there was almost an entire freedom from seasonal diseases. This was attributed mainly to the provision of shelters, improved watering arrangements, and a regular supply of green food at the beginning of the hot weather. Experience proved that the herbage had little nutritive value, and animals lost condition if any reduction was made in the grain and forage ration. Hay or bhoosa feeding in the lines was essential in order to maintain horses and mules in good working condition ; grazing could only be looked upon as an adjunct to the full ration.

Operations on the Euphrates by the 15th Division and 11th Cavalry Brigade, March, 1918.

These operations resulted in the capture of the Turkish position at Khan Baghdadi and a cavalry pursuit to Anah. Operations by the 15th Division commenced on March 26th, were continued

throughout the night, and were rewarded by the capture of the main body of the enemy on the morning of the 27th. The pursuit, which continued until Anah was reached on the 28th, was chiefly carried out by the 11th Cavalry Brigade and Mechanical Transport. Anah was evacuated on the 30th, and the troops were withdrawn to Haditha, from there to Khan Baghdadi on April 11th, and to Sahiliyah on April 13th. The animals were watered at Sahiliyah on the night of March 25th, and as the left bank of the river was held by the enemy, it was not possible to water them again until 6 p.m. on the 26th when Khan Baghdadi had been captured.

At the commencement of operations a veterinary detachment was stationed at Ramadi, a mobile veterinary section at Hit, and one at Sahiliyah ; no change was made in their situation during the operations.

About 800 captured ponies and mules were collected at Khan Baghdadi and sent in batches to Hit, where they were segregated for mallein testing. The majority required treating for mange before being issued to transport companies ; and those fit for immediate work were put in working isolation and employed on transport duties in connection with the camp. It is interesting to note that many of these animals were affected with *filaria haemorrhagica*.

The operations in which the 11th Cavalry Brigade took part extended from March 26th to April 1st, excluding the march from Baghdad to the seat of operations and the return march to Dhibban. The strength of the Brigade was 3,350 horses and mules. From 3.30 a.m. on March 26th to 11 a.m. on March 28th the distance covered was about ninety miles from the camp, two miles south-east of Sahiliyah to Anah, commencing with a movement around the enemy's right flank on the 26th, thence to Alus bend on the morning of the 27th, and to Anah on the morning of the 28th. The ration issue averaged two-thirds of the full grain and fodder ration and was supplemented by grazing, particularly at Anah.

Water was obtained at pools in wadis on the 26th ; it was good and plentiful in the Wadi Hauran, and the majority of the horses were watered twice or three times during that day ; on the 27th they were watered from the river in the morning and from good pools in the evening at Wadi Ausijiyah. After this day they were regularly watered from the river.

Animals for evacuation were dealt with by the mobile veterinary sections and veterinary detachments and despatched to the advanced base veterinary hospital, Baghdad, from railhead at Dhibban. The total dead wastage during the period was 25. There were 22 cases of exhaustion, 88 cases of lameness, 39 sore backs, and the number of animals inefficient on the last day of the operations was 144. As a result of the hard marching, shortage of rations, and a night of torrential rain, followed the next day by a cold wind, the horses showed a considerable loss of condition. The approximate distance covered from March 18th to April 6th was 355 miles, with halts at Fallajah, Hit, and Anah.

Owing to the disposition of the cavalry regiments engaged in the pursuit, the G.O.C. cavalry brigade ordered the brigade veterinary officer and No. 8 Mobile Veterinary Section to halt at Sahiliyah, where they remained through the operations.

From the nature of the operations it would appear that the mobile veterinary section or a detachment from it would have been useful nearer the fighting line, and could safely have gone on to Khan Baghdadi, or even to Hadithah. If fighting had continued, and there had been heavy casualties, units would have been hampered by sick and wounded animals, pending the arrival of the mobile veterinary section. The brigade veterinary officer should have accompanied brigade headquarters to arrange collection and evacuation of the sick and to advise the G.O.C. on veterinary matters generally.

The Kifri-Kirkuk-Tekrit Operations—April and May, 1918.

Prior to these operations the cavalry division was abolished and the cavalry brigades were organized into self-contained formations. The 14th Division, with the 6th and 7th Cavalry Brigades, took part in these operations.

The 14th Division (column A), to which the 6th Cavalry Brigade was attached, marched from Sharaban on April 24th and returned there on May 19th. The total distance covered by mounted units was about 500 miles, and by units with vehicles about 250 miles; the greatest distance covered by mounted units in one day was about 40 miles, and by units with vehicles, i.e. ambulances, mobile veterinary section, ammunition column, transport, etc., about 25 miles.

Up till April 29th rations were issued on the operation scale, after that date on half scale; grazing was plentiful throughout, except the last two marches on the homeward journey, and the water supply good; animals were watered three or four times daily.

Three hundred and eight cases were admitted to the mobile veterinary section—94 exhaustion and debility, 97 saddle injuries (sore backs and contused withers), 58 wounds, 56 lame cases, and 3 cases of fever. The total dead wastage was 74, and 186 cases were evacuated. The general condition of the horses at the end of the operations was poor.

7th Cavalry Brigade.—The various units of the brigade experienced hard and trying marches from April 20th to May 24th. The bhoosa ration was reduced by half, but as grass was plentiful and units took full advantage of the grazing, and also cut grass for their animals, the shortage of bhoosa did not have a serious effect. The march from Akab to Sumarrah on May 4th was very trying on account of the heat and the absence of wind. On the night of May 6th the saddle blankets were soaked by heavy rain and had to be placed under the saddles wet when a start was made before dawn; this caused a number of sore backs. The total dead wastage was 37. Total admissions, 392. Evacuated, 118.

Amongst the Indian cavalry horses there was a high proportion of sore backs, almost entirely due to loss of muscle. In view, however,

of the work performed and the difficulty in obtaining good water after leaving the river, the casualties were not excessive. The condition of the mules was excellent throughout the operations.

The Tekrit Operations by the 17th and 18th Divisions with the 7th and 3rd Cavalry Brigades during October and November, 1918.

17th Division.—The period of active operations lasted from October 20th to 30th. The horses of the artillery brigades covered about 100 miles during this period; the road was very bad during the march over the Jebel Hamrin pass on the 25th and during the marches from October 27th to 29th.

Rations.—Operation scale was issued up to October 25th; then half rations to November 1st; some local "jowari" was available at Sherquat.

Water Supply.—Plenty of water was available for units up to Fathah. From the 26th to the 29th the majority of units were only able to water once or twice a day in the Tigris river; arrangements were made to water about 500 animals daily from a well at Ain Dibs, and well water was also available at Bulalig.

Location of the Mobile Veterinary Sections.

The mobile veterinary section of the 7th Cavalry Brigade was located at Ain Nakailah at the beginning of the operations, and moved to Fathah Gorge on the right bank of the Tigris via Tekrit, where it arrived on October 30th, and collected sick from both sides of the river.

The mobile veterinary section of the 18th Division was located at Jift, on the right bank of the river, and collected from both sides of the river. The 17th Division mobile veterinary section was located at Abu Rajas, and a portion of the 3rd Cavalry Brigade mobile veterinary section was at Tekrit assisting a field veterinary detachment which dealt with the casualties and evacuated them to the advanced base veterinary hospital, Baghdad.

The sick were collected and marched to the nearest mobile veterinary section at Sherquat. From there they were despatched in batches, marching by the river road to Qualah-al-Bint, where they rested the night and continued the march on the following morning to the mobile veterinary section at Fathah, thence from the mobile veterinary sections at Jift and Abu Rajas to the field veterinary detachment at railhead.

Captured Animals.—A large number were collected at Sherquat and sent to a captured animals' camp formed at Tekrit, where they were inspected by a remount and a veterinary officer. Eighty-four useless animals were destroyed, including one case of clinical glanders. The dressing of a large number of wounds and galls was carried out by the aid of two Turkish veterinary officers and their dressers, and mallein testing was done by the veterinary officer in charge of the camp.

Casualties.—The dead wastage was 21 horses and 42 mules, including 8 horses and 42 mules killed in action. The number admitted sick up to November 7th was 222 horses and 105 mules.

18th Division for the period October 20th to November 1st.

Many units carried out long and trying marches. The 336th Brigade R.F.A. covered an average of over 30 miles a day, the ammunition column 26 miles on the hardest day, the divisional train averaged 25 miles, and on several days covered 30 miles ; the horses with infantry brigades covered up to 19 miles in one day.

Rations.—Operation scales were issued up to October 24th. From the 25th to the 31st the grain ration was reduced to 6 lb., and no bhoosa was available, but in the region of the Lesser Zab there was some rough grazing. In other parts various green crops, jowari, etc., were found, and some units made use of a quantity of bhoosa which had been hidden in pits by the retreating enemy.

Watering.—This was at times very difficult. Use was made of bitumen wells by units away from the river ; the water in these was brackish ; horses drank a little, but mules practically refused it.

Location of the Mobile Veterinary Section.

As already stated, the mobile veterinary section was located at Jift on the right bank. This position was taken up under orders from the 1st Army Corps. It would have been better placed at Fathah and Lesser Zab after October 24th, but owing to the nature of the operations it was not possible to locate the mobile veterinary sections to the best advantage.

Casualties.—The total dead wastage during the period was 27 horses and 50 mules, and the number admitted sick up to November 1st was 127 horses and 38 mules. The work of the mobile veterinary sections in connection with operations continued long after the actual operations had ceased, and in this instance 517 animals were admitted and 447 evacuated during the period from October 20th to November 21st.

7th Cavalry Brigade for the period October 10th to November 3rd.

From the time the brigade left camp on October 10th until it bivouacked about seven miles south-east of Mosul on November 3rd long marches were carried out, the most trying being on October 28th, when the brigade left camp at 1 a.m., marched to the Lesser Zab and crossed it at 7.15 a.m., halted till 8 a.m. to water and feed. Moving north till 3.30 p.m., the brigade (less " V " Battery, R.H.A., " V " Ammunition Column, and the 13th Hussars) crossed the Tigris by the ford at Hadraniyah before dark. The distance was the

longest covered during these operations, 57 miles in 36 hours, 40 miles of which were covered between 1 a.m. and 3.30 p.m.

Rations.—A full supply was available until October 25th, when the brigade were without forage and had to make use of the emergency corn sack ration for grain. Green fodder was fairly plentiful on the Lesser Zab and at most places from near Hadranayah to Mosul. It consisted of jowari and nearly ripe maize.

Water.—Except on October 22nd and 23rd water was easily obtainable and of good quality. On the 22nd, at Ain Nakailah, it was very alkaline, and the animals did not drink freely. On the 23rd water was brought up by Ford convoy to supplement the supply, but did not arrive in sufficient quantity to allow more than the barest minimum ; some units were only able to obtain two canvas bucket-fulls for each animal.

Evacuation of Casualties.—Under orders from the 1st Army Corps the mobile veterinary section was left at Ain Nakailah on October 22nd, and was never in touch with the brigade from that date. It was not, therefore, possible to carry out an organised system for the evacuation of casualties.

3rd Cavalry Brigade for the period October 6th to November 3rd.

The brigade marched from Sheikh Habib, Euphrates front, on October 6th and arrived at Tekrit on October 22nd, with halts of one day at Khirr Camp, near Baghdad, and seven days at Al Ajik. The average daily distance covered during the eight marching days was nineteen and a half miles, exclusive of six miles to Tekrit from Aujah. A uniform pace of five miles an hour was maintained by the cavalry and R.H.A. ; that of "A" Echelon (L.G.S. wagons) was four miles an hour, and "B" Echelon (A.T. carts) about three miles an hour.

Time was an essential factor in the operations on October 24th and 26th, and the strenuous nature of the operations will be realised from the following facts :—

142 miles were covered between 3 a.m. on October 23rd and 12.30 p.m. on the 26th ; animals watered at 6 p.m. on the 22nd ; the next watering was at 12 noon and 6 p.m. on the 23rd ; moving again on the 24th, the advanced portion watered at 18 miles' distance and then went on at a fast pace for 29 miles.

At 12.30 p.m. on the 26th the brigade crossed the Tigris and galloped to a position about 5 miles away. The horses were saddled up from dawn to dusk. There was constant movement during the day, and movement, whether to the attack or on reconnaissance, had to be carried out for the most part at a gallop.

The watering was irregular, and few men were available to carry it out. The distance from cover to the river was from $1\frac{1}{2}$ to 2 miles and exposed to long-range machine-gun

and rifle fire. During a march of 45 miles to the Lesser Zab on the 24th the heat was severe, but the horses showed little distress, chiefly on account of the fact that a previous reconnaissance carried out by the G.O.C. enabled the brigade to make straight for the water-holes at Garha (16 miles) and Hajal (30 miles).

In spite of the exceptional hard marching, the long distances without water, and the shortage of forage, none of the horses fell out from exhaustion during this advance, pointing to good hard condition on starting ; but the effects of this strenuous time appeared later during the return march to Mosul, when twenty horses had to be destroyed for exhaustion.

Casualties.

1. Battle Casualties :

Killed	..	..	..	..	110
Drowned	..	..	..	..	17
Missing	..	..	..	..	47
					<hr/> 174

2. Died and Destroyed :

Exhaustion	20
Laminitis	11
Sprains	2
					<hr/> 33

Total dead wastage	207
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3. Evacuated :

Wounded	56
Saddle galls	100
Laminitis	40
Debility	39
Sprains	22
Injuries	..	..	..	..	13
Fever	..	..	..	..	3
Unclassified	..	..	..	..	4
					<hr/> 277

In addition to these casualties, 100 cases were under treatment in the brigade, making a total inefficiency (less dead wastage) of 377.

Condition of Animals at end of the Operations.

Taking into consideration the arduous nature of the operations over a very difficult country, the general condition of the horses was fair, and with rest, full rations and special diet, such as green food, bran, etc., they soon recovered their condition.

Note.—Prior to these operations the 3rd Cavalry Brigade was known as the 11th Brigade ; see Operations on the Euphrates, March, 1918.

The Location, Organization and Working of Veterinary Units, 1917-18.

Veterinary hospitals were situated as follows :—

At Basra,	3	Indian F.V. Sections	{ Each section capable of dealing with 250 sick animals. See W.E., M.E.F., No. 681, Aug., 1918. Table "A."**
„ Amara,	2	„ „ „	
„ Baghdad,	4	„ „ „	

The hospitals were organized on the basis of existing Indian war establishments, with modifications and additions as considered most suitable for the country. The hospital at Baghdad was worked on the same lines as a veterinary hospital, home armies, for 1,000 horses. In spite of the transfer of cases to Amara and Basra whenever barges were available, also by rail in special cases of emergency, the average daily sick in the Baghdad hospital from April to September, 1918, was 1,500; in November it reached 1,700. An amended war establishment to deal with 1,500 sick, proposed in September, 1918, was not sanctioned until December; fortunately a large reserve of syces was available which enabled the strenuous work to be carried out until the proposals were put into effect.

Selection of Sites.—The sites were selected after careful consideration with regard to shade, accessibility of water, room for extension, and their suitability as centres for dealing with evacuations.

Construction, etc.—The hospitals were divided into sections with standings and paddocks. At the Basra hospital there was stabling for 500 horses in open sheds roofed with reed mats, and paddocks for 400 horses, all having a fair amount of shade. At Amara the arrangements were similar to those at Basra, and existing buildings were converted for use as stabling, etc. At Baghdad mat shelters and horse tents obtained from India were used; the latter proved invaluable both during the hot weather and the rains. They were erected over rammed standings with a central mud manger; the isolation lines for febrile cases, such as piroplasmosis, etc., consisted of loose boxes made with mud walls, rough wooden poles, and roofed with horse tents. Excellent boxes were thus erected quickly and economically, a factor of great importance in a country where wood of any kind was very difficult to obtain. The hospital covered an area of about 25 acres, with 16 paddocks, averaging 150 ft. by 150 ft. each, and about 10 acres of cultivated land.

The usual arrangements existed for watering and feeding in the paddocks by means of mud mangers and a mud water channel, the water being conveyed from the Tigris to all parts of the hospital by means of oil pumps which discharged into a main channel and were then diverted into subsidiary channels as required.

Organization and Working of the Hospitals.

The general principles adopted for the working of veterinary hospitals in France† were carried out, but for reasons already given certain modifications were necessary.

* See page 344.

† See Chapter XXV.



Station Veterinary Hospital, Baghdad. Paddock showing tents.

At the Baghdad veterinary hospital the organization was as follows :—

Detail.

Headquarters consisting of :—

- (a) Officer Commanding.
- (b) Warrant officer and staff.
- (c) Office staff.
- (d) Quartermaster's staff.
- (e) Shoeing staff.
- (f) Admittance lines.
- (g) Isolation lines.

The various classes of cases, i.e. wounds, medical, and lameness, were grouped in sections.

Warrant Officer.—The warrant officer had the general supervision of the working parties and the co-operation of the sections. All men surplus to establishment were dealt with by him and formed a fatigue party for carrying out special work, such as cultivation, wood construction, etc.; men required for emergency purposes were drawn from this party.

Office Staff.—One European and two Indian clerks. The European clerk was responsible for the clerical work in connection with animals, one Indian clerk dealt with personnel and the other with stores, etc.

Quartermaster's Staff.—This was composed of :—

- (a) One "ration naik" and 12 syces for loading and unloading wagons, handling from 350 to 450 maunds of horse ration a day, in addition to ordnance and engineer stores, etc.
- (b) One "sanitary naik," responsible for the sanitary condition of the camp and the disposal of the carcasses. Under him were four sweepers and a party of men for the handling and burning of litter, and two chamars for skinning carcasses and the manufacture of grease.
- (c) Three modies.
- (d) Two carpenters.
- (e) Drivers of wagons and ambulances.

Shoeing Establishment.—Owing to the trying nature of this work during the hot weather the shoeing staff was principally Indian with Europeans for supervision and special work as follows :—

Farrier serjeant	..	..	..	1
Corporal shoeing-smiths	..	..	..	2
Nalbands	..	..	..	12
Syces under instruction	..	..	..	4

The farrier serjeant supervised the shoeing and the general care of the feet; one shoeing-smith carried out the surgical shoeing, the other supervised the work of the nalbands and attended to special cases.

Indian Personnel.—A veterinary assistant was employed in each section.

Syces.—Each section supplied men for duty in the admittance lines, isolation lines, quartermaster's stores, one syce for

instruction in shoeing, one for control of the water supply, repair of bunds, etc. The remainder were divided into four sub-sections each under a naik; these sub-sections were generally formed on the basis of one syce to six horses, any surplus of personnel forming a section fatigue party.

Numbering of Cases.—The number of each case was clipped on the near saddle and retained until the animal was discharged. This method of marking was carried out for the following reasons :—

- (1) It can be seen at a glance.
- (2) It is very quickly put on and remains discernible for a month at least.
- (3) It cannot be lost or misplaced, and can be more easily examined than a number on a ticket or disc.

Blood Examination and Clinical Charts.—In a tropical climate it is most important that clinical charts should be kept and blood smears taken from fever cases, and it was the routine in hospitals here. The smears were sent to the veterinary bacteriologist for examination and report. Cases of piroplasmosis were treated in a special isolation line, and a special paddock was set aside for the convalescent cases.

Surgical Section (Dressers).—In addition to the usual sub-sections, this section had a special organization consisting of 1 farrier serjeant, 12 syces (trained dressers), 4 syces under training, 1 sweeper, and 1 bhisti. They were responsible for the dressing of wounds, the care of the pharmacy, operating shed, dressing shed, and the equipment and stores used in them.

Construction Work.—In this country, where building consists principally of mud work, and engineering and other materials were difficult to obtain, an enormous amount of work other than that of a veterinary nature had to be carried out by the hospital personnel. When a hospital is started while active operations are in progress, as was the case at Baghdad, there is an increased demand on other units, and no reliance can be placed on outside help.

Among the most important works which have to be put in hand immediately are the construction of mangers, standings, roads, incinerators, latrines, cookhouses, and graves for animals. The war establishment of an Indian field veterinary section for 250 sick animals was not capable of dealing with this work in a hospital where a large amount of construction work had to be carried out; nor was the equipment sufficient. The sections had only one pickaxe each.

Repair of Mud Work.—Under the conditions existing in this country the mud constructions require constant attention. With the exception of the operating shed and the forge, the whole of the Baghdad hospital was constructed of mud; repairs are easy in the summer months, but difficult in the wet weather as all mud work is brought to a standstill.

Drainage.—This was carried out by means of deep trenches and a soakage pit about 15 by 15 by 20 ft., enclosed by a mud wall, situated in the corner of each paddock. The trenches were filled in

after the rains were over. This proved to be the only efficient way of keeping paddocks fit for use in this country, where a small amount of rain turns the ground surface into a muddy, sticky mass some inches deep. It will therefore be readily seen that the staff required to run a hospital efficiently under the conditions existing at the veterinary hospital, Baghdad, was much greater than in a place where labour and building materials are easily obtained, or where suitable buildings exist and only require conversion to be adapted to hospital use. If horse tents had not been available for the hospital, animals could not have been protected from the sun and rain owing to the impossibility of obtaining building material.

Disposal of Carcasses.—This is a matter for consideration in countries where carcasses cannot be disposed of other than by burial. There is no sale for them ; the natives will not take them as a gift ; therefore, after the hide and fat have been removed they have to be buried 6 ft. deep ; this alone takes up the whole time of three men.

During the dry, hot weather carcasses from veterinary units and field units were also disposed of by removing them to a selected spot, where they were disembowelled and the viscera buried deeply, or the stomach and intestines opened up and the contents spread out in a thin layer to dry quickly and so prevent flies breeding, the empty carcasses being left to be disposed of by nature, and the dried remains being collected and burnt, if necessary.

Evacuation.—The original proposal regarding the formation of the veterinary hospital, Baghdad, comprising four field veterinary sections, was to deal with 1,000 horses. The commander-in-chief decided that the number should be 800 horses, and every endeavour was made to keep the number down to this limit. Evacuations to Amara and Basra were carried out as frequently as transport by barges became available ; in emergency, transport by rail was used, but it was not possible to keep the average number in hospital under 1,200 from November, 1917.

The war establishment of the veterinary hospital at Baghdad is reproduced in Table "B" at the end of this chapter.*

Shortage of Syces, etc.

During 1915 and 1916 field veterinary sections were run under difficulties owing to the shortage of syces. During 1917 sufficient reinforcements arrived to complete all veterinary units up to full strength and allow of a reserve for sickness, etc. The surplus syces were accommodated at the veterinary convalescent depot, Basra, where a veterinary depot was formed.

When No. 7 Field Veterinary Section first started work at Sheikh Saad the camp was laid down as in Field Service Regulations (Veterinary) ; a reed mat shelter above each horse line was asked for, but was not completed until three months afterwards. There was no proper line gear, and animals were tied up with bhoosa wire, old telephone wire, etc. ; mud mangers were erected as soon as labour became available ; until then animals had to feed bhoosa off the

ground, and the forage had to be man-handled from the supply depot to the lines. The dust storms during August, September, and October often made veterinary work impossible.

During June, July, and August, 1916, there were only two Europeans with No. 7 Field Veterinary Section, and no reserve was available. Although these men were far from fit, they carried out their duties in a most praiseworthy manner under most trying conditions; during this period a shade temperature of 125° was recorded.

The advanced veterinary store depot was also attached to this section during this period, but without personnel to run it, as at that time medicines were seldom received; there was little work to be done except work of a clerical nature in connection with indents which, if they could not be complied with, had to be acknowledged.

This description of the conditions which existed during the early part of the year 1916 shows the necessity for an increased personnel, British and Indian, for Indian field veterinary sections, especially when there is such a large amount of work to be done in addition to that of a veterinary nature, which was always the case in this country, where climatic conditions render a reserve essential. The lack of reinforcements threw more work on the remaining personnel; this was followed by increased sickness, and often occurred at a time when the number of sick animals was inclined to increase.

Modifications and Additions to a Field Veterinary Section, War Establishment, India (Provisional), 1916, carried out in Mesopotamia during 1917 and 1918.

(a) *Personnel*.—The tindal and tent Lascars were withdrawn and replaced by two syces.

(b) The following were added :—

Corporal shoeing-smith	..	..	1
Line orderly	..	..	1
Nalbands	..	..	2
Mochi	..	..	1

Transport.—This was allotted as found necessary for the working of the hospitals.

Equipment of Field Veterinary Sections.—The hospital boxes were antiquated and were replaced by modern equipment as supplied to home hospitals.

The following additions to the equipment of field veterinary sections combined as field veterinary hospitals were made :—

Instruments.

Quittor set	{ Double-edge sage knife.		
	Right	"	"
	Left	"	"
Tourniquet rubber.			
Esmarck's bandage.			

Bone forceps, straight, angular, and curved	..	1 set.
Forceps, foot testing	.. .. .	2
Retractors	.. .. .	2
Tenaculums	.. .. .	2
Special needles for intravenous chloral anaesthesia, etc. ; the same length as those supplied with the intravenous injection outfit, but double the bore.		
Sterilisers.		
Roaring instruments.		
Instruments, post-mortem, case of.		
Irons, pyro-puncture with three copper needles.		
Chloroform muzzle.		
Mallein syringes for I.D.P. method.		
Intravenous injection outfit.		
Anti-rinderpest syringes.		

Ordnance Equipment.

The equipment sent with field veterinary sections was amplified on the basis of the 1915 Mobilization Store Table for a Veterinary Hospital, Expeditionary Force (L. of C.), with local modifications as found necessary.

One forge, field G.S., was approved for each field veterinary section.

Persian Heaters.—These were issued in lieu of stoves, Soyer's, which were not available.

Tubs, I.G.—For the preparation of soft food, used as boilers, fixed in a mud or brick structure. This proved to be the best form of boiling apparatus for this purpose. The capacity of each was 12 gallons; they were economical and superior in every way to Soyer's stoves. Persian heaters were used for preparing hot water for use in the dressing and operating sheds, etc.

Slings, horse, with tackles differential, 15 cwt.—Issued to veterinary hospitals as follows:—

Baghdad, 4 sets; Amara, 2 sets; Basra, 3 sets.

Clippers, horse, machine, Stewart.—Issued on a scale of 1 per cent. of average strength of animals in hospital.

Torch, electric.—For nasal and dental examinations. Scale, 1 for each hospital.

Kitson lamps.—Veterinary hospital, Baghdad, for operating shed and dressing shed, 2.

Wheelbarrows, or handbarrows, for removal of litter.

Carts, ambulance, horse.

Stable tents.—Tents to accommodate 450 horses in the hospital, Baghdad, were supplied by India, and arrangements were made for a further issue to accommodate 250 horses in the veterinary convalescent depot, Baghdad, and overcome the difficulties in the supply of material for sheds.

Operating Table (designed by Temp. Capt. Lang, A.V.C., and Acting Farrier Q.M. Serjt. Nunn, I.S.V.C.).

This operating table was first erected at the veterinary hospital, Amara, at a cost of about £10, and an improved pattern was made at the veterinary hospital, Baghdad.

The table was easily manipulated and proved to be a very valuable addition to the hospitals. Between April and December, 1916, over 500 animals were put on the table at Amara without a single accident, and the one at Baghdad was in constant use from September, 1917. A new building to contain pharmacy, operating, and dressing shed was erected at Basra, and an operating table was supplied. The veterinary equipment of one field veterinary section was found sufficient for use of three sections combined to form a hospital.

Additions made to improve the working of a Field Veterinary Section.

For a field veterinary section the following increase in personnel:—

Conducting party.—One N.C.O. and fifteen syces for each field veterinary section for evacuation and line work.

Naiks or Syces.—An increase of two paid naiks, one for sanitary and one for ration duties.

Veterinary dressers.—Three syces who were trained dressers and paid at the same rate as transport veterinary dressers of the Supply and Transport Corps whilst on field service.

Cooks.—One for each section for the British personnel in addition to the one for Indians.

Sweepers.—Three for each section, to allow of their undertaking all the sanitary work.

Ordnance Equipment.

Axes, pick, and spades.—Increased to ten for each section. The amount of construction work, trenches for drainage, etc., rendered this increase necessary under the conditions existing in this country.

Wheelbarrows, for removing litter from lines to incinerators, etc.

Trolley for removal of carcasses.—A suitable conveyance is required under conditions where all carcasses have to be buried, as in this country. The construction of a special vehicle could not be carried out, and a G.S. wagon was issued to each hospital for this special purpose.

Watering gear.—One hand pump and two canvas water troughs for each section, capable of watering fifty horses at a time; also canvas water buckets, one to two horses.

Transport.—The want of transport on section charge was greatly felt; it was often difficult to get, even for conveying rations, and impossible to obtain any for internal transport work. Five A.T. carts for each section were recommended.

Mobile Veterinary Section.

The working of these units was as laid down in Veterinary Manual (War), 1915. They were equipped and maintained in



Station Veterinary Hospital, Baghdad Operating shed, showing operating table ready to swing over.



Station Veterinary Hospital, Baghdad. Operating Table in position.

accordance with the existing mobilization store tables for Indian mobile veterinary sections, as laid down in the special war establishment for Indian expeditionary forces, with the addition of one Stewart clipping machine.

Personnel.—Mixed British and Indian.

Recommendations to improve the working of these Units.

(a) As these are mixed formations at least one N.C.O. should have some knowledge of Hindustani and the working of Indian followers. When posting N.C.Os., the senior should be selected as having a knowledge of military discipline, drill, duties of guard, etc., the other for veterinary duties, and well trained, this distinction being made when they are posted.

(b) An English-speaking naik of syces is essential.

(c) A cook to enable the syces to have their meals as soon as they turn out of stables, and do away with the necessity of each man having his own fire; all syces should be of the same caste in order that this may be carried out.

(d) All personnel to be trained before being sent on service, to have some idea of handling animals, and to be physically fit for mounted duties.

(e) *Equipment.*—The addition of a hand pump and collapsible water trough would be very valuable in a tropical country.

Camel Hospitals.

Owing to the prevalence of surra in every camel corps in this country, the establishment of camel hospitals was not feasible. Animals were therefore kept at work as long as possible, and the sick were dealt with in unit lines under veterinary supervision.

Field Veterinary Detachments.

One detachment was established permanently on the Nasiriya front from April, 1917. See War Establishment, Table "C."* The veterinary officer visited all units in the area, inspected all slaughter animals, and also carried out meat inspections. Minor cases were treated in the detachment lines, and those requiring prolonged treatment were transferred to the base veterinary hospital by rail. This was equipped on the scale of a mobile veterinary section modified to suit requirements.

Other detachments were formed as necessary and equipped with first-aid equipment, picketing gear, etc., according to the requirements of the operations.

Convalescent Depots.

Convalescent depots were situated at Tanooma, Basra, capable of dealing with 800 horses, and at Baghdad for 400 horses. See War Establishment, Table "D."†

The former was opened in May, 1917, and the latter in February, 1918. The organization and working of these depots were based on

the instructions for the co-ordinate working of veterinary hospitals, the paddocks being arranged as follows :—

- (i) Reception paddock.
- (ii) Inspection paddock.
- (iii) Sorting paddocks.

Cases fit for discharge were placed in a discharge line to ensure that they were well groomed, well turned out, and shod before discharge.

The depot at Tanooma had wooden rails, sheds, etc., with the usual exercising track, forage shed with cement slab, and trough for mixing damped and boiled food, clipping shed, etc. Horse tents were used at Baghdad in paddocks having no natural shade. Equipment was drawn and maintained according to the mobilization store table for a convalescent depot, home armies.

The situation as regards Veterinary Personnel.

The situation generally was serious during 1916, and the formation of mobile veterinary sections was delayed owing to the want of personnel.

In 1917 there was a serious shortage of veterinary officers owing to sickness, transport difficulties, and the arrival of formations from India without veterinary officers. There were only three veterinary officers with divisions, viz., the A.D.V.S., one with the artillery brigades, and one with the mobile veterinary section. Conditions had improved by 1918, but there was still a shortage of eleven officers in August of that year, making it difficult to find officers for duty with the Persian lines of communication and Dunsterforce where the number of animals employed was constantly increasing.

In January, 1917, large numbers of syces were under training in India and drafts came as welcome reinforcements from that country in April, 1917.

The Training of Shoeing-smiths and Veterinary Dressers.

Courses of instruction for training British N.C.Os. and men as shoeing-smiths, and drivers of supply and transport companies and field ambulances as dressers to veterinary assistants were carried out at the veterinary hospital, Baghdad, during May and June, 1918. The extra duties entailed by these classes was a severe strain on the veterinary hospital staff, which was working at very high pressure throughout the hot weather, but as sufficient shoeing-smiths and dressers could not be supplied by India it was essential to make every endeavour to render the force self-supporting in these respects.

Indian Shoeing-smiths.

Owing to the shortage of Indian Royal Artillery shoeing-smiths, partly trained men and others considered suitable for training were given a course of instruction in cold-shoeing under farrier serjeants of the artillery units.

Nalbands (Supply and Transport Corps).

During 1918 the shortage in India was such that the force in Mesopotamia became largely dependent on men trained locally. Training was carried out in transport companies, and courses of instruction were held at the Veterinary Hospital, Baghdad, where twenty men were trained at a time.

Shoeing.—Horses and mules were shod in front or all round according to the conditions under which they were working. North of Baghdad and on the Persian lines of communication the surface was rough, and in those areas it was necessary to shoe mules all round.

The shoe recommended for use in this country is that formerly made for South Africa and Egypt. The Indian pattern shoe at first supplied was too narrow in the web and caused considerable lameness if removals were not very regularly carried out.

Owing to the small number of shoeing-smiths allowed for each transport company in 1917, viz., two for 600 animals, and to the fact that the mules were out at work during most of the day, it was very difficult to give the necessary attention to the feet of unshod transport animals; these got into a very bad state if the wall was not rounded off to prevent splitting, and if the heels did not receive the attention required to keep the feet at the normal angle.

The experience gained during operations in an exceptionally rough country showed that it was necessary for each animal to carry a spare set of shoes and nails in addition to the ordinary reserve carried in the wagons.

The Formation of a Garrison Forge at Baghdad.

In 1917 the following were attached to the nearest mounted units for shoeing :—

The Military Governor and Staff.

The Baghdad Garrison Staff.

The Military Mounted Police.

The Political Department.

The units to which the foregoing were attached for shoeing experienced great difficulty in carrying out this extra work owing to sickness among their shoeing staff, and even with their full staff there was sufficient work in their own unit. The formation of a garrison forge was therefore sanctioned. The personnel consisted of one British and one Indian shoeing-smith, both permanent base men medically unfit for service with units in the field, and one follower. A suitable building was obtained in a suitable position and the garrison veterinary officer attended periodically. This arrangement successfully relieved a difficult situation.

Forage.

The scale of forage rations was amended from time to time to conform to the supply situation, and although the scales allowed were good the full ration was often not available owing to transport difficulties.

Sources of Supply.

Barley	..	..	..	Locally and from India
Gram	..	..	..	From India.
Bhoosa	..	..	..	Locally and from India.
Hay..	..	..	..	From India.

In 1918 large quantities of barley and bhoosa were available in the country, and eventually the local supply of barley was sufficient to allow of a grain ration of barley all produced locally ; prior to that a mixture of gram and barley was used.

Bran.—When available, 2 lb. in lieu of gram were issued for large animals and 1 lb. for small animals, principally to those sick, until the situation permitted of a general issue.

Dates.—Used in veterinary hospitals—1½ lb. substituted for 1 lb. grain.

Oil Cake.—1 lb. substituted for 1 lb. grain, issued to units on a veterinary officer's certificate.

Rice.—Occasionally issued to units during shortage of other grain, but the substitution was limited to half a grain ration of gram ; this is essential in order to adjust the nitrogenous ratio of the mixture and prevent loss of condition in the animals.

Cleaning and Crushing Local Barley.

The great grain centre is situated at Hillah on the Euphrates. An attempt was made to carry out crushing by means of the local stone mills, but was not a success, and efforts were then confined to cleaning the local barley prior to issue. Hand sifting was tried by units, but this did not free the grain from large lumps of dirt. Consequently, the plan of soaking for one hour, and giving the feed damp, mixed with bhoosa, was recommended.

Crushing and cleaning take time and involve trouble and expense, but these processes pay well in the end, as the use of dirty, uncrushed barley as food means a great loss of nutritive value ; large amounts are passed undigested ; animals lose condition, and digestive troubles result.

Clipping.

Horses and mules were clipped before the end of November and kept clipped, excepting the legs. Clipping was essential for the maintenance of condition and also for the early detection of mange.

The Formation of Civil Veterinary Dispensaries at Baghdad and Basra.

These institutions prevented much suffering among local animals, and also helped to safeguard the animals of the force by checking the spread of contagious disease.

The conversion of existing buildings was carried out at the expense of the municipalities, and the veterinary equipment supplied was eventually paid for from the civil funds.

A N.C.O., R.A.V.C., or I.C.V.D., was placed in charge of each dispensary. Arabs were trained to carry out the various duties of

dressing, dispensing, shoeing, etc., and a veterinary officer carried out periodical inspections. These dispensaries were well patronised and soon became self-supporting.

Diseases.

The control of contagious disease necessitated the vigilance and unceasing efforts of all concerned. The measures for their prevention and eradication were often carried out under exceptionally trying conditions, and the results obtained, which compare favourably with those of any other theatre of operations, reflect great credit on those who gave of their best in order to maintain the efficiency of the service in this respect.

The following diseases were prevalent throughout the campaign:—

- Epizootic lymphangitis.
- Foot-and-mouth disease.
- Glanders.
- Mange.
- Piroplasmosis equine (biliary fever).
- Rinderpest.
- Trypanosomiasis in camels (surra).

And among those occasionally met with were:—

- Anthrax.
- Equine enzootic paraplegia.
- Piroplasmosis, bovine.

Epizootic Lymphangitis.

This disease is undoubtedly one of the most difficult to control under active service conditions in a country where it is enzootic, and this proved to be the case in this country, where, in spite of unceasing efforts towards its eradication, outbreaks continued to occur throughout the campaign. The majority of cases were traceable to wound infection; there was evidence in some cases of wound-to-wound infection through failure to diagnose the original case. The usual preventive measures were carried out; annexures to General Routine Orders were published calling attention to its prevalence, method of spread, prophylactic measures, etc., and full use was made of the veterinary bacteriological laboratory for the diagnosis of suspected cases. In many cases it was impossible to trace the source of infection, and evidence pointed to infected soil being responsible for the disease in cases where transmission by wound dressing could not be traced. This was very evident during outbreaks at the remount depots, Basra and Amara, where the disease continued to appear in spite of the most rigorous preventive measures, but it disappeared on evacuation of the paddocks in which the cases were occurring. Dust and flies were also a potential source of infection, and particular attention was paid to the covering of all wounds and the application of fly preventive dressings. In November, 1917, a recrudescence occurred after a clear interval of six months.

In January, 1918, a memorandum was circulated calling attention to the fact that the disease had recently been diagnosed microscopically in cases where the only lesions were pustules, with a rapidly developing cellulitis or lymphangitis, but no cording of the lymphatics, and emphasising the necessity for sending pus smears from any suspicious lesion to the veterinary bacteriologist, Baghdad, for examination and report. Veterinary assistants were warned to keep a sharp look-out and report any suspicious lesions to a veterinary officer without delay.

It was impressed on all concerned that all wounds under treatment in a unit at the time a case was discovered must be regarded as immediate in-contacts and kept under close observation, and that if any of these animals were transferred to a veterinary hospital a record of the case should accompany each animal stating that it was an in-contact.

Foot-and-mouth Disease.

Outbreaks of this disease occurred among the slaughter cattle at river-head in 1916, and it was prevalent among the herds at Ali Gharbi, Sheikh Saad, and Arab Village in January, 1917. The disease also appeared among the transport bullocks at Basra and Baghdad during 1918. It was of the benign type usually met with in the East and was easily controlled.

Glanders.

Although this disease was very prevalent among the local animals and those of the enemy, in its most dangerous form, i.e. acute clinical glanders, the disease was easily controlled by the usual measures, viz., immediate destruction of the affected, constant and careful inspection and mallein testing, working isolation, and disinfection.

Cases of this disease were introduced by animals from India and the animals of the civilian population; strays from the enemy and captured animals were a constant source of danger.

During the summer of 1917 it was found that units were sending debilitated horses direct to the advanced remount depots instead of evacuating them to the advanced base veterinary hospital through a veterinary unit. In view of the prevalence of glanders, and the fact that debilitated animals were often found to be affected with the disease, a General Routine Order was published to the effect that animals considered by veterinary officers to be debilitated, or suffering from veterinary disability, were to be evacuated to receiving veterinary hospitals as veterinary cases for inspection, isolation, and mallein testing before being sent to a remount depot.

The procedure of withdrawing animals from field units directly into remount depots constitutes a grave danger, especially in a country where contagious diseases are prevalent.

The following is an example of the results obtained by mallein testing:—

A clinical case was discovered in the advanced transport depot, Baghdad; this necessitated the testing of 376 mules and ponies in

the depot and the tracing out and testing of 1,379 mules and ponies recently issued to field units. As a result of these measures one reactor was discovered in the depot and a few reactors among mules issued to two divisions. Widespread infection would have followed had these cases not been discovered in this early stage. The routine mallein testing carried out in veterinary hospitals resulted in the effective control of the disease in these units throughout the campaign.

During the summer of 1918 the disease was very prevalent among the Gharry ponies in Basra City, and owing to the difficulty of safeguarding the animals of the force under the conditions then existing special steps were taken to deal with the constant menace as follows:—

All privately owned ponies within municipal limits were placed in an isolation camp where mallein testing was carried out, and those passing the test were registered and branded; clinical cases and reactors were destroyed and compensation paid. In order to ensure freedom from further outbreaks, new purchases by private owners were isolated, tested, registered, and branded before being allowed to apply for hire.

Some very acute cases were seen during this outbreak. The following is an example:—

A pony was inspected by the base veterinary officer on the evening of May 23rd. Subcutaneous nodules were present scattered over the body; there was a slight catarrhal discharge and the animal walked with a stiff gait. On the morning of the 26th the animal could only breathe with difficulty; the nodules were much more pronounced, and the general symptoms were those of the acute septicaemic form of the disease.

When acute clinical glanders occurs among animals running loose in paddocks, immediate evacuation of the paddocks and picketing of the animals for mallein testing are essential to ensure rapid control and eradication of the disease. This was well proved in the case of the refugee animals encamped at Baqubah which were very badly inspected on arrival. In spite of the mallein testing acute clinical cases continued to appear until the animals were picketed out to prevent infection being spread by acute cases developing between the periods of testing.

Mange.

Although this disease was prevalent among the animals of the country and those of the enemy, the preventive measures adopted resulted in comparative freedom from the disease among our animals. The camels were occasionally badly infected, but the only serious outbreak among equines was that which occurred among the horses and ponies of the 12th Cavalry Division on their return from Kasr-i-Shirin, on the Persian frontiers, in March, 1918.

During the very inclement weather the horses were placed in native buildings for shelter, and the disease was undoubtedly contracted through occupying infected buildings. The disease was of the sarcoptic variety and was distributed throughout the regiment;

all animals showing any signs of skin lesions or pruritis were evacuated to a special isolation camp at Baghdad; 167 horses and 9 mules were sent by rail, and the trucks were disinfected by a party from the advanced base veterinary hospital under the supervision of a veterinary officer.

This disease cannot be satisfactorily dealt with by units in the field. The regiment consequently marched into Baghdad, where the animals were placed in a camp adjoining the isolation camp, to which cases were evacuated as they were discovered, a total of 220 horses and 54 mules being dealt with. The outbreak was soon under control, but in view of the danger of a recurrence of this form of the disease it was arranged to return direct to the regiment the cured cases, which were kept in working isolation for a further period of one month, thus obviating any risk of infecting the remount depot. This method of dealing with a generalised outbreak in a regiment proved very effectual, and the regiment marched out from Baghdad free from disease with their horses in good condition.

The dressings used for this disease included calcium sulphide, sulphur and oil, and crude fuel oil. The latter dressing only necessitated three or four applications, and its introduction resulted in great economy, the oil being obtained from the wells at Abadan, whereas both the ingredients used in making the sulphur and oil dressing had to be brought from India. The crude fuel oil softened the scales and crusts, and when these fell off, or were removed by gentle hand rubbing, the skin had a healthy appearance and was soft and pliable. The pruritis soon disappeared, animals seldom bit themselves after the first dressing had been applied, and quickly improved in general condition.

Piroplasmosis, Equine. (Biliary Fever.)

This disease was one of the chief causes of inefficiency, especially during the summer months. Large numbers of animals became infected and remained carriers of the disease, and were therefore liable to remissions when subjected to conditions which lowered their vitality, such as exhausting work, especially during the hot weather, insufficient food and water or other causes of debility, extremes of climate, etc. Several severe outbreaks occurred, and in addition to these outbreaks a considerable number of cases were constantly being admitted to hospitals from all parts of the country.

Microscopical examination of blood smears from a large number of affected animals showed that both species of the organism responsible for the disease, viz., *Piroplasma caballi* (Nuttall) and *Nuttallia equi* (Laveran) exist in Mesopotamia. As a rule, infections by *Piroplasma caballi* were of a milder and more chronic character than those caused by *Nuttallia equi*.

The blood of horses which have passed through an attack either of piroplasmosis or nuttalliosis remains infected long after recovery, possibly for life, whether drug treatment has been carried out or not, and whenever the vitality of infected animals is reduced by any cause

the parasites are liable to increase and exert a pathogenic effect on the body, although they may not become sufficiently strong to produce characteristic symptoms of the disease.

Cases of *Piroplasma equi* infection were observed in which the symptoms were not marked and recovery had taken place without specific treatment ; such attacks might easily pass unnoticed until attention was drawn to the animal on account of the subsequent anaemia and debility. The value of injections of quinine acid hydrobromide intravenously in cases of debility was observed in India, and the results obtained at the veterinary hospital, Baghdad, by Shilston, suggested that whether the debility in horses was due to any great extent to infection by *Piroplasma equi* or not, the treatment of pronounced cases by the injection of quinine was fully justified by the results.

The only species of tick observed on horses was the *Hyalomma aegyptium*, which is also very common in India.

The favourite situations for this species are in the mane and tail and inside the ear, which accounts for their presence being occasionally overlooked. The fact that a single infected tick can convey the disease, and the impossibility of ensuring absolute freedom from tick infestation, is sufficient to explain the constant presence of this disease in a country where ticks are prevalent and the animals of the country are carriers of the disease.

As already mentioned, the specific treatment of the disease by quinine acid hydrobromide intravenously gave excellent results, and in cases where it could be carried out in the early stages of the disease, and the animals placed under favourable conditions, the mortality was low.

During April, 1917, many horses of the British and Indian cavalry in the Khalis canal area were suffering from the disease ; it was most apparent in units which had occupied the Turkish cavalry barracks at Baghdad, and undoubtedly originated there, as ticks were found on the horses during their occupation of the barracks and ground in the vicinity. As only 30 out of 320 suspected cases were showing the characteristic symptoms of the disease, it was considered that a large proportion of the cases were simple fever, the result of exposure to the sun and possibly of the animals having been worked with a slight temperature.

A more serious outbreak occurred a little later in a brigade of field artillery of the 13th Division which had also picketed at the barracks. The disease developed suddenly and acutely in 130 horses within 48 hours, the average pyrexial period being six days and the duration of the attack two weeks, but in some cases intermittent fever persisted for over three weeks. Four deaths occurred at the beginning of the outbreak, due to the animals being worked with a temperature before their condition was discovered.

During the week ending April 16th, 1917, 59 cases were admitted to the veterinary units, of which 42 occurred in the Baghdad area. There were 3 deaths among 30 cases under treatment in the cavalry

division. During October, 1918, a number of cases occurred among the animals of the 15th Division camped in the Ramadi area after the operations there. The camping grounds had been occupied by the enemy and ticks were prevalent.

As losses were occurring through failure to recognise the disease in the early stages, and to evacuate them to the mobile veterinary section for treatment, the following memorandum was circulated with excellent results:—

Office of the A.D.V.S., 15th Division,
31st October, 1917.

Circular Memorandum No. 1.

Biliary Fever.—This disease which is prevalent in this country is due to a blood parasite which infects the red blood cells and is conveyed from affected to susceptible animals by means of infected ticks, and probably also through the medium of blood-sucking flies, in cases where an animal with a severe infection is left standing in the lines in contact with others.

The disease is enzootic, and although local animals may not show any signs of it they may be immune carriers, and ticks which have fed on them convey the disease to susceptible animals.

Investigation has shown that the blood of a recovered animal remains infected for an indefinite period, and these animals are liable to relapses when their resistance is lowered from another disease, hard work, exposure to the sun, etc. Therefore, cases of chronic debility are often found to harbour the parasites in their blood.

Symptoms.—The first symptom of the disease is a very sudden rise of temperature; an animal which appears to be in good health suddenly shows signs of exhaustion when at work, especially when exposed to the sun, or if standing in the lines refuses his feed or leaves a portion of it; there may be no other symptoms at this stage except a rise of temperature up to 105° or 106°, or even higher, with intermissions about every three days.

Following on these initial symptoms there is marked jaundice; the membranes of the eyes, lips and gums are stained a deep yellow, there are usually a few blood red blotches on the membrane of the eye (petechiae), marked dullness, increased respiration, mucous coated faeces, and in very severe cases marked exhaustion, staggering gait, and occasionally the urine is blood or coffee coloured (Haemoglobinuria).

Treatment, etc.—Where possible, an animal showing symptoms of exhaustion during work, or refusing all or a portion of its feed, should have its temperature taken without delay. Any such case showing a temperature over 101° should be kept apart from other animals; if on the march it should be thrown out of work, given water at every opportunity, and led along to save further exhaustion.

Shade and a plentiful supply of water are essential. Wherever possible, cases should be placed in the shade and water kept near them; cases should be reported to a veterinary officer without delay, or, if a mobile veterinary section is available, they should be sent to it at once, as immediate treatment by intravenous injection of quinine cuts short the attack, prevents complications and shortens convalescence; the longer cases remain without proper treatment the greater the danger of fatal complications, and even if recovery takes place the animal is so debilitated that it requires evacuation to a hospital for long rest and feeding up.

Fever cases should not be retained in the lines of a unit without reference to a veterinary officer, because the temperature suddenly drops to normal or thereabouts. In this disease the temperature usually drops during the first 24 hours of the attack, then suddenly rises again during the next three days.

When no veterinary officer or mobile veterinary section is available, the best treatment is the administration of 8 ounces Epsom salts in a pint of water

as soon as possible, followed by 4 ounces morning and evening for three successive doses, and a carbonate of ammonia or stimulating ball twice daily, bran mashes only, a plentiful supply of water and shade.

Prevention.—Ticks should be picked off horses and burnt. This should be part of the grooming and regularly carried out. Small immature ticks are often found around the dock and require careful looking for; it is as important to remove these as the mature ones.

Buildings which have had local animals in them generally contain ticks, which may be hidden away in the dirt on the floor, or in the cracks in the walls; these buildings should not be utilised for horses if it is found that ticks are very numerous; when essential to make use of them as shade for sick animals, etc., the ground should be thoroughly cleaned, all refuse removed some distance from the lines, and the surface of the ground well burnt over before animals are put into them.

In cases where ticks are present in the cracks of walls, etc., the only efficient way of eradicating them is by means of a blow lamp.

Although the mortality during outbreaks was not great, the resulting debility and the liability to a recurrence of the disease were responsible for considerable inefficiency and wastage.

Rinderpest.

The disease was enzootic and of a benign type, the average mortality being from 2 to 5 per cent.

In November, 1916, the supply of fresh meat was rendered precarious owing to the prevalence of rinderpest and foot-and-mouth disease on the left bank of the Tigris, and instructions were given to march cattle on the right bank in small batches, with suitable feeding arrangements at halts and precautions taken against over-driving. The mortality was considerably reduced by these methods, and the outbreak was over by the first week in January. In December, 1916, the employment of transport bullocks in this area was proposed, and arrangements were made to carry out serum inoculation of all bullocks at the various posts before they proceeded up country.

Throughout 1917 and 1918 periodical outbreaks occurred among the slaughter cattle, transport bullocks, and dairy farm cattle. An outbreak was also reported in February, 1918, among the local cattle in the 3rd Army Corps area on the Dialah river. Steps were taken to limit movement and prevent spread of the disease to our herds.

The most serious outbreak was that among the slaughter cattle at Basra during September, 1918, when there were about 2,500 cattle and 15,000 sheep in the depot. The slaughter of in-contacts for food was continued, provided that their temperature did not exceed 102° F. on the morning they were to be slaughtered.

No animals were issued alive and none were admitted until the disease was stamped out. The inoculation of all transport bullocks and dairy farm stock by the simultaneous method before despatch from India was recommended, but this could not be done as the inoculation staff was insufficient to meet the military requirements in that country. Outbreaks were therefore dealt with by the serum-alone method, also by serum inoculation and mixing with infected animals.

Twenty-four Ayrshire bulls from England arrived at Basra in April, 1918; they were inoculated with serum immediately on arrival, 120 c.c. being given to each animal. In order to immunize them actively, arrangements had been made for the supply of virulent blood from India. This was sent in sealed tubes packed in a thermos flask, and arrived ten days after the animals had been received, but unfortunately the glass of the thermos flask was smashed during transit and the blood proved to be non-virulent.

Owing to the presence of piroplasmosis, it was not safe to carry out the simultaneous method by using blood from animals in the country. The production of active immunity was therefore carried out by serum inoculation and mixing the inoculated animals with infected animals at the first available opportunity.

Storage of Serum.

During the hot weather arrangements were made for the storage of serum in a special cold storage room at the Central Power Station, Baghdad, and for its distribution as required by means of refrigerator barges. The whole of the serum used in the country was supplied by the Imperial Bacteriological Laboratory, Muktesar, India.

It is interesting to note that Persia had been entirely free from the disease for about twenty-five years until it was introduced from Baluchistan in 1918, and during 1918-19 it swept the country from end to end with an average mortality of about 60 per cent.

Trypanosomiasis—Surra in Camels.

The Arabs were well aware that biting flies were responsible for the transmission of the disease, and avoided sending their camels into the fly-infested area along the Tigris and Euphrates, whereas the camels of the force had to work wherever operations necessitated their presence. It will therefore be realised that our efforts to control this disease were to a great extent nullified by the exigencies of the service, and the resulting inefficiency was such that the camel corps were constantly rendered unfit to carry out the duties required of them. These conditions existed throughout the campaign, and although much useful work was done under very unfavourable conditions camel transport was on the whole a failure.

The disease in camels is of a chronic nature; infected animals can work for some time under good conditions, but when aggravated by a combination of strenuous work under bad climatic conditions, insufficient rest for rumination, shortage of forage, surra can only result in a rapid and heavy mortality. Even with extra food and supervision, the condition of the camels of the force did not, as a rule, compare favourably with that of the local Arab-owned camels.

Some of the causes contributing to this were:—

- (a) Camels purchased in one district had to be employed wherever required, whereas the Arab owner would on no account work his animals for any length of time outside his own

area. He would only sell them for this purpose and would never hire them out.

- (b) Many of the surra zones were not known to us.
- (c) Government camels were worked according to a fixed programme, and often had to be rushed over their work, with the result that their grazing hours were insufficient.
- (d) The supervision did not equal that given by the Arab owner. The sarwan recruit knew nothing about the animals, and only gave a minimum of care to them under continual supervision.

During 1917, 80 per cent. of the camel mortality, as shown in the weekly returns, was due to surra. In the 5th Camel Corps, out of 288 animals in camp, 128 were destroyed because they were in a hopeless state of emaciation. The remainder were in fair condition and were transferred to the 4th Corps. In the 6th Camel Corps, out of a strength of 407, there were 364 diagnosed cases of surra.

It was necessary to employ the 4th, 5th, and 6th Camel Corps in the Baghdad district during the hot weather of 1917, but 1,080 animals which were free from surra in the Nasiriya and Basra areas were sent to the Zobin district at the end of March of that year, as that district was considered the healthiest in the country for camels. This experiment proved a great success. The animals were watered from deep wells, and 1,072 returned to Basra in October in excellent condition, and no cases of the disease occurred while they were there. It is reasonable to assume that if they had remained in camps near the river in the region of the surra belt, which extends from Nasiriya to Fao, the loss during the fly season would have been at least 50 per cent.

The incidence of the disease was very high during May, 1918, attributable to the late rains and the consequent swarming of tabanidae. In some units 70 to 80 per cent. of the camels were known to be affected, and a large number died or were destroyed during the hot weather months. In one instance about 2,000 camels were purchased in the Shaiba district and Hillah-Hindiyah area without the veterinary directorate being informed; accordingly, no veterinary inspection was made. These places were surra zones, and the animals were marched into another surra zone, the result being a general infection with a heavy mortality.

The serious mortality from surra was the subject of periodical discussion, and preventive measures were recommended, but the exigencies of the service did not permit of the recommendations being carried out.

In August, 1917, the following measures were adopted :—

- (1) All affected animals in the 5th and 6th Camel Corps were transferred to the 4th Corps, and transfers continued from time to time as cases appeared in other corps.
- (2) All camels in the 4th and 5th Corps found free from the disease were transferred to the 6th Corps.

The effect of these measures was as follows :—

- (a) The 4th Corps was an infected unit.
- (b) The 6th Corps was composed of animals which were free from any signs of the disease, but had been in contact with affected animals.
- (c) The 5th Corps was cleared of all infected and in-contacts, and into this corps all newly purchased animals were drafted.

When the transfers had been effected the camels of one corps were not allowed to mix with those of another.

It was pointed out that, although this scheme would prevent the spread of the disease in corps, it did not eliminate the danger of re-infection, and unless steps could be taken to prevent this by the avoidance of known surra zones, the purchase of camels in a fly-free area only, and the working of them apart from infected animals, the disease would continue to spread and the mortality remain serious. The conditions existing would not, however, allow of thorough preventive measures being carried out. It was therefore proposed that :—

- (a) The infected corps should work, as far as possible, in a fly area where they could not spread the disease to other animals, but could remain there until worked out.
- (b) The surra-free corps should be employed in surra-free zones only and not allowed to mix with other corps.
- (c) No further purchases should be made, but that hired camels should be employed.

It was emphasised that unless something of this nature could be done the camel as a transport animal in this country would continue to be a failure. There were, however, difficulties in the hiring of camels ; the rates charged were so high in 1918 that it proved more economical to buy the animals, even if they only lasted six months.

Reasons for not forming Camel Hospitals.

The concentration of sick camels at veterinary hospitals on the lines of communication proved a failure.

An establishment of Sarwans and a proportion of supervising personnel were drawn from the camel corps and placed under the command of a veterinary officer at Sheikh Saad, Amara, and Basra, in December, 1916. Blood examinations were regularly carried out and all diagnosed cases of surra were eliminated at once. A large number of animals were treated for sore backs and mange, but the majority, when approaching convalescence, died from surra.

Had we been dealing with surra-free camel corps, the formation of camel hospitals and the evacuation of the sick would have been the proper method to adopt, but as the majority of the debilitated animals were surra-infected, and the withdrawal of all sick and debilitated animals would have thrown the corps out of action, the formation of camel hospitals in this country was neither feasible nor economical.

Enzootic Equine Paraplegia in Mesopotamia.

This disease is fully dealt with in the following report by Captain C. J. R. Lawrence, Veterinary Bacteriologist, and Captain E. B. Reynolds, commanding the Veterinary Hospital, Baghdad, at the time of the outbreak.

Introduction.

1. At the end of July and the beginning of August, 1918, there was an outbreak among the horses and mules of the 3rd Corps of a diseased condition characterised by a more or less severe local or general loss of muscular power and co-ordination of movement. It was being variously diagnosed—"paraplegia" and "spinal paralysis" being the names most commonly adopted to designate the condition. In accordance with instructions received on August 19th, we visited the area in which the 3rd Corps was stationed and investigated as far as was possible the outbreak. The result is detailed in this report. No description giving the details of the symptoms displayed during the course of the condition had been given, although several divergent opinions had been expressed as to its cause:—intestinal parasites, grazing, feeding of jowari, kumri and heatstroke.

During the course of our tour about fifty cases were seen, and five post-mortem examinations were made. It was not possible, however, during the short time at our disposal and the extensive area to be covered, to observe closely the succession of symptoms in any particular case, but by examining and closely observing a number of animals which had been affected for varying lengths of time and were displaying various stages of the affection, we are enabled to give a more or less complete description of the symptoms shown through the whole course of the condition, which are as follows:—

Symptoms.

2. The animal, which almost without exception is in good condition, even better than the majority, may be noticed to be lame or otherwise unable to perform its work while on parade, or at exercise, or being "off feed," and any of these symptoms may be the first indication that it is unwell. In the early stage a variable degree of excitement and nervousness is generally shown, accompanied by twitching of the lips, eyelids and ears, and trembling of the muscles in the region of the shoulder, flank and thigh. This state subsides in from twelve to twenty-four hours and is followed by a period of dullness and depression. Loss of muscular power and co-ordination of movement are marked symptoms. The time of onset, the degree and localisation of these signs are exceedingly variable. The variation in the time of onset may be more apparent than real, for, while in some cases it appears to be gradually progressive up to from twelve to twenty-four hours, and in others to occur suddenly, it may be that in the latter case the actual onset is unobserved, due to its occurring while the animal is at rest.

The degree and localisation vary from a slight inco-ordination of certain groups of muscles, or of the whole body, to actual paralysis. In some cases the anterior portion of the body is more affected than the posterior, and in others the reverse is the case. Unilateral facial paralysis sometimes occurs in conjunction with the other symptoms and laryngeal paralysis, with acute dyspnoea, has also been observed; both subsiding with improvement of the other symptoms.

After twenty-four to forty-eight hours the loss of power tends to decrease—should the animal get down in the early stages he is raised with difficulty; some are able to stand when raised, and others are not able to do so. If allowed to remain down some animals struggle violently, soon damaging themselves to such a degree as to necessitate their destruction. In connection with this it is worthy of particular note that when slinging was systematically carried out from the onset very few cases proved fatal, whereas when this

precaution was neglected the percentage of cases having a fatal termination was enormously increased. From the foregoing it is evident that the action of the animal during progression varies considerably according to the part or parts affected, ranging from a general "wobbling" to an inability of one or more limbs. In the majority of cases there is a tendency to drag the limbs, but marked flexion is seen in a few—"hackney action in front and stringhalt behind." From this it would appear that the flexors are more commonly the seat of the loss of power than the extensors. The probable explanation of the marked flexion sometimes seen is that it is due, not to stimulation of the flexors but to depression of the extensors, thus allowing an uncontrolled flexion. In bad cases there is what may be described as a hesitancy in the action and an unsteadiness of the limbs when placed on the ground. When affected anteriorly the animal's action conveys the impression that he is "feeling for" the ground. On turning the animal round short the inner limb is used as a pivot and the outer one dragged rather than moved round.

The temperature may be raised one or two degrees during the first twenty-four to forty-eight hours and then returns to normal. The heart's action is markedly changed—this is probably the most constant symptom of any observed.

The pulse rate during the excitement stage may be slightly increased, but even in this stage if an endeavour is made to get the animal quite quiet the pulse rate may be found to be slower than normal. After this stage has been passed all cases show a marked lowering of the pulse rate; a pulse of twenty-six being quite common and in some cases it has been found to be even less than that. In later stages it is irregular and intermittent as well as infrequent, and on the animal being excited, rapid, violent and a-rythmic contractions of the heart are noticed. The membranes are inclined to be dirty and injected. The appetite is at first in abeyance but soon returns, and food is often eaten more voraciously than usual.

3. There appeared to be no suggestion of any contagiousness of the condition, for no direct connection could be traced between the affected units in the corps and the cases occurring in one unit.

4. In continuation of the summary of the symptoms observed during our visit to the 3rd Corps area, we are now able to give the details and disposal of those cases sent to the advanced base veterinary hospital.

Number of animals admitted to hospital	.. .. .	72
Number of animals discharged to remount depot	.. .. .	26
Number of animals transferred to veterinary hospital, Amara		1(a)
Number of animals transferred to veterinary convalescent depot, Baghdad	.. .. .	45(b)
Average length of time in hospital	.. .. .	29 days.
Average length of time in veterinary convalescent depot	.. .. .	14 to 21 days.

(a) This animal appeared quite recovered from any nervous trouble and was evacuated for lameness.

(b) These animals showed no signs of paralysis or inco-ordination of movement, but there was still some irregularity of the heart's action, and they were sent to the veterinary convalescent depot to have further rest and regulated exercise before being finally discharged. Two were later re-admitted to hospital affected with lameness.

Post-mortem Examinations.

5. In order to avoid injury to the central nervous system the animals were destroyed by being chloroformed and bled to death. Five thorough post-mortem examinations were carried out; material was collected from various tissues and fluids of the body for microscopical and cultural examination; blood, pericardial fluid, and cerebro-spinal fluid being obtained from each case. The latter material was collected in a sterile syringe by

removing all muscular and other tissue situated inferiorly to the atlanto-occipital articulation, and by dissecting away the inferior membrane of this joint and piercing the duramater with the needle of the syringe. Macroscopic lesions were conspicuous by their absence, the only noticeable abnormality being a slightly blood-tinged colouration of the fluid in the cerebro-spinal canal.

Enquiries.

6. Careful enquiries were made into the feeding (rations, grazing, and local grown fodder), watering, stabling, and general environment of the animals.

In connection with grazing, enquiry was instituted through the political authorities as to whether any trouble of a similar nature had been observed by the Arabs, or was known to exist locally. There were rumours that some kind of trouble in horses was known to exist; but, due either to a reluctance of the Arabs to state it, or their inability to do so, no information could be obtained sufficiently definite to be of any value.

A circular memorandum was sent to the D.D.V.S. base, D.A.Ds. V.S., brigade veterinary officers, etc. (other than those in the 3rd Corps area), describing the symptoms and asking if cases had occurred, or were occurring, in their areas. A negative reply was received in each instance.

Trypanosomiasis, Equine.

During 1918, nineteen cases were confirmed as a result of blood examinations carried out at the veterinary laboratory, Baghdad. Seven of these cases were horses and ponies attached to the 5th Camel Corps.

Anthrax.

Sporadic outbreaks occurred from time to time, and were easily controlled by the usual methods, i.e. evacuation of the lines, cremation of carcasses, thorough disinfection, and the marking of the place where burial was carried out.

Piroplasmosis, Bovine.

The disease was reported to exist among native cattle, and in December, 1917, blood films from suspected cases at the government dairy farm, Baghdad, were examined at the veterinary laboratory, but no piroplasms were detected. In this connection it should be noted that this disease may be widespread in a country, but, on account of the lasting immunity conferred by one attack, and the great scarcity of the parasites in the blood of immune animals, microscopic evidence of the disease cannot be obtained except from acute cases or at the period of crisis during a relapse.

The only outbreak recorded from October, 1916, to December, 1918, was among the six Ayrshire bulls at the Baghdad dairy farm in October, 1918. The disease manifested itself in a severe form, one bull died soon after showing signs of illness, the remainder recovered after treatment with trypanblue intravenously.

It is interesting to note that these bulls were immunised in England against *Piroplasma bigeminum*, and were re-infected in Mesopotamia by the *Piroplasma mutans*.

VETERINARY HISTORY OF THE WAR
WAR ESTABLISHMENT.
MESOPOTAMIAN EXPEDITIONARY FORCE

TABLE A.

A Field Veterinary Section (capable of dealing with 250 Sick Animals).
No. 681.

August, 1918.

(i) Personnel and Animals.

	British.					Indian.			Animals.	
	Officers.	S./Sjts. & Sjts.	Artificers.	Rank and file.	Total.	N.C.Os.	Public followers.	Pte. followers.	Riding horses.	Ponies.
Veterinary officer ..	1	—	—	—	1	—	—	2	2	—
Q.M.S. farrier	—	—	—	—	(a)	—	—	—	—	—
Serjeant farrier	—	1	—	—	1	—	1(b)	—	—	1
Shoeing-smiths	—	—	2(c)	—	2	—	1(b)	—	—	1
Line orderlies	—	—	—	2	2	—	1(b)	—	—	1
Veterinary daffadar ..	—	—	—	—	—	1	—	—	—	—
Clerk	—	—	—	—	—	1	—	—	—	—
Public followers	—	—	—	—	—	—	108 (d)	—	—	—
Total	1	1	2	2	6	2	111	2	2	3
Attached S. & T. Corps	—	—	—	—	—	—	6(e)	—	—	—
Total (including attached)	1	1	2	2	6	2	117	2	2	3

(ii) Transport.

Detail.		Vehicles.	Drivers.	Draught horses or mules.
Carts	Ambulance, horse ..	1	1	2
	A.T.	2(g)	2	4
	Water	1(f)	1	2
Wagons, G.S.		1	2	4
Total		5	6	12

(a) One Q.M.S. farrier will be allowed for a F.V. section at the base.

(b) Supplied by S. & T. Corps.

(c) Includes a corporal.

(d) Includes :—Pakhali, 1; Bhisti, 1; Cook, 1; Sweeper, 1; Nalbunds, 2; Mochi, 1; Naiks of syces, 4; Veterinary dressers, 3; Syces, 94—Total 108.

(e) Provided from transport depot.

(f) One for each section or group of sections.

(g) Provided locally from station transport.

TABLE B.

Veterinary Hospital. (800 Horses.) Mesopotamia. War Establishment.

(i) Personnel.

Detail.	Personnel.										Horses.		
	Officers.	Warrant officers.	British.			Rank and file.	Havildars and daffadars.	Indian.		Total.	Riding.	Draught.	Total.
			Staff-serjeants & serjeants.	Artificers.	Rank and file.			Rank and file.	Public followers.				
Major	1	—	—	—	—	—	—	—	—	1	2	—	2
Captain or subalterns	4	—	—	—	—	—	—	—	—	4	4	—	4
Quartermaster-serjeant	—	1	—	—	—	—	—	—	—	1	—	—	—
Farrier quartermaster-serjeant	—	1	—	4	—	—	—	—	—	1	—	—	—
Farrier staff-serjeants	—	—	—	—	—	—	—	—	—	4	—	—	—
Farrier serjeants	—	—	—	2	—	—	—	—	—	2	—	—	—
Serjeant	—	—	(a) 1	—	—	—	—	—	—	1	—	—	—
Shoeing-smith corporals	—	—	—	(b) 4	—	—	—	—	—	4	—	—	—
Privates	—	—	—	—	6	—	—	—	—	6	—	—	—
Clerks	—	—	—	—	1	—	—	—	—	3	—	—	—
Batmen	—	—	—	—	10	—	2	—	—	10	—	—	—
Daffadars	—	—	—	—	—	—	2	—	(d) 422 (c)	2	—	—	—
Followers	—	—	—	—	—	—	—	—	—	422	—	—	—
Total	5	2	1	10	17	2	2	2	422	461	6	22	28
Attached—Drivers S. and T. Corps	—	—	—	—	—	—	—	11	—	11	—	—	—
Total (excluding attached)	5	2	1	10	17	2	2	2	422	461	6	22	28

(a) 1 serjeant, 1 dresser, and 1 syce for Veterinary First Aid Section at Kut.

(b) Includes 2 corporals for conducting parties.

(c) Includes 4 pakhalis, 4 bhistis, 4 cooks, 5 sweepers, 12 nailbands, 3 mochies, 2 carpenters, 14 naik syces, 13 veterinary dressers and 361 syces.

(d) Includes 40 for evacuation of sick horses to Amarah and extra work on lines.

TABLE C.

*Veterinary Detachment (Euphrates Front), Mesopotamia.**War Establishment.*

Detail.	Personnel.						Horses.	
	British.		Indian.			Total.	Riding.	Ponies.
	Officers.	Staff-serjeants and serjeants.	Rank and file.	Public followers.	Private followers.			
Officer	1	—	—	—	—	1	2	—
Serjeants	—	2	—	—	—	2	—	2
Syces	—	—	—	10	—	10	—	—
Batmen	—	—	—	—	2	2	—	—
Salutri	—	—	1	—	—	1	—	—
Total	1	2	1	10	2	16	2	2

TABLE D.

*Convalescent Horse Depot. (800 Horses.) Mesopotamia
War Establishment.*

(i) Personnel and Horses.

Detail.	Personnel.							Horses.		
	British.				Indian.			Riding.	Draught.	Total.
	Officers.	Staff-serjeants and serjeants.	Artificers.	Rank and file.	Public followers.	Private followers.	Total.			
Captain ..	1	—	—	—	—	—	1	2	—	2
Lieutenant ..	1	—	—	—	—	—	1	1	—	1
Staff-serjeant	—	1	—	—	—	—	1	—	—	—
Serjeants ..	—	3	—	—	—	—	3	—	—	—
Farrier-serjnt.	—	—	1	—	—	—	1	—	—	—
Shoeing-smiths	—	—	(a) 4	—	—	—	4	—	—	—
Privates ..	—	—	—	(b) 10	—	—	10	—	—	—
Syces ..	—	—	—	—	184	—	184	—	—	—
Pakhali ..	—	—	—	—	1	—	1	—	—	—
Bhisti ..	—	—	—	—	1	—	1	—	—	—
Cooks ..	—	—	—	—	2	—	2	—	—	—
Sweepers ..	—	—	—	—	4	—	4	—	—	—
Nalbands ..	—	—	—	—	6	—	6	—	—	—
Mochis ..	—	—	—	—	2	—	2	—	—	—
Batmen ..	—	—	—	—	—	4	4	—	—	—
Total ..	2	4	5	10	200	4	225	3	16	19
Attached— Drivers, S. and T. Corps ..	—	—	—	—	(c) 12	—	12	—	—	—
Total (excluding attached)	2	4	5	10	200	4	225	3	16	19

(a) Includes a corporal.

(b) Includes 2 lance-corporals, 1 clerk, 1 cook.

(c) Provided by base transport.

(ii) Transport.

Detail.	Vehicles.	Drivers.	Draught horses or mules.
Cart, ambulance, horse ..	1	1	2
Cart, water	1	1	2
Carts, A.T.	2	2	4
Wagons, G.S.	4	8	8
Total ..	8	12	16

TABLE E.

VETERINARY STATISTICS, MESOPOTAMIA. 1914 to 1918.

Showing the Average Annual Strength, Average Constantly Sick, and Mortality per cent. of Strength.

Period.	Animals.	Average strength.	Average number constantly sick.	Percentage of sick on strength.	Died, killed, and destroyed.	Percentage of mortality on strength per annum.
January to December, 1916.	Horses, mules, bullocks and camels.	51,755	2,029	3.92	1,237	9.56
January to December, 1917.	Horses and mules	63,968	3,583	5.60	4,786	7.34
	Bullocks ..	4,534	212	4.67	332	7.32
	Camels ..	2,939	829	28.20	2,077	70.67
	Total ..	71,441	4,624	—	7,195	—
January to November 11th, 1918.	Horses...	36,969	4,074	11.02	3,135	10.17
	Mules ..	44,095	1,548	3.51	1,277	3.46
	Bullocks ..	4,378	201	4.59	296	8.11
	Camels..	2,494	328	13.15	2,158	86.52
	Total ..	87,936	6,151	—	6,866	—

CHAPTER XIV.

THE VETERINARY SERVICES IN INDIA, 1914-18.

THE outbreak of war in August, 1914, brought into prominence certain special features that would affect India in the event of that country being actively involved. Among these were the possible developments that might bring in new enemy countries, and thus be a special cause of anxiety to India by stimulating her traditional enemies; the possible active participation of India in Western, Eastern, and other theatres of war; the suitability of her organization for this; and the special difficulties likely to arise in connection with the many castes. There was also the fact that India depends on the United Kingdom for the bulk of her supplies of all kinds.

These various considerations indicate the factors that had to be kept in view in allowing organizations to proceed from India. It was necessary also to be mindful of the frontier and internal demands that might at any time be made. These last considerations alone, apart from the war in the West, might sufficiently tax the energy and resources of India.

The veterinary organization at the time of the outbreak of war was that of field veterinary hospitals (comprising two sections), and base depots of veterinary stores, of which there were three; there were, however, reserves as well. The items of technical equipment of the field veterinary sections and base depots of veterinary stores were of old-standing types and might be described as having become obsolete long before the war. A complete change of system is, however, difficult to introduce; it is always costly; old contracts must always run out before a change is made, and such contracts are, with so distant a base, usually of long standing. This factor is of importance in considering the co-operation of Indian formations with British and other organisations, and the feasibility of maintaining supply in the field of personnel, equipment, and stores of all kinds.

In the earlier days of the war divisions embarked with their allotted veterinary units. At a later stage small formations or only reinforcements moved, and veterinary units had to be formed as circumstances permitted.

With the dwindling of the normal establishment of India and its distribution to distant centres, the necessity of restoring the loss without delay became quickly apparent. Area troops in even greater numbers filled the place of the departed divisions. Trained officers and personnel, particularly farriers and shoeing-smiths, were most urgently needed. For a year none had appeared to replace the enormous depletions, until at last India fell to a total of *seven veterinary officers* to deal with the whole country, including the divisions that had not gone overseas and the new and untrained

formations which had come out from the United Kingdom ; animals about three times as many as those that India normally held were being collected for reinforcements, and to make good the depletion. Next arose the task of training subordinate personnel of all kinds, British and Indian, to fill the heavy list of vacancies, and also as reinforcements to replace casualties and complete the complement of new formations. To aggravate the situation, an exceptionally virulent type of influenza ravaged practically every military station throughout India during the hot weather of 1915, giving a casualty list in equines of about 97 per cent. How the group of seven veterinary officers for all India strove to grapple with this epidemic can never be fully told ; their difficulties were overlooked at a time when all eyes were turned to the great conflict in progress.

There is one important point to be noted at this juncture. The troops on the frontier north of the Indus had been left intact to secure India from attack from that direction. With such a disease as influenza rampant in India, steps should have been taken to ensure that it never crossed the Indus, which was a suitable and natural barrier at which to limit movement. This, however, was not done. It was fortunate that the border tribes never moved to the attack during this period, having spent themselves in a very severe attack only a month or two earlier.

The permanent consideration that remained was the supply of more veterinary officers and trained personnel. The Indian Civil Veterinary Department helped to a certain extent, but this department, with the few notable exceptions that were made, had practically no whole-time veterinary officers to spare. Individual officers of the I.C.V.D., in addition to the performance of their other duties, made great efforts to help. Some of the officers of the Indian Civil Veterinary Department already held commissions in various volunteer units, either as combatant or veterinary officers, but as they were restricted to those units they could not be employed where their professional services were most required. To obviate this difficulty a special veterinary branch of the Indian Army Reserve of Officers was formed, to which these officers were transferred, and to which any civilian veterinary surgeon practising in India, who wished to serve, could be posted. This enabled the services of these officers to be used wherever the Director of Veterinary Services wished.

Civil practitioners at that time were far from numerous, and such as were available came forward. Later on, towards the close of 1916, temporary, and some regular, officers began to arrive from the United Kingdom or from France. The temporary officers had, however, to learn about the climate, and to know something of the native languages and the new conditions and customs of the country before their help could make itself felt.

The necessity for other changes had begun to be apparent. Among these was the growing need for the complete veterinary administration of all animals in India, whether of the British or Indian army, by the Army Veterinary Corps. As things were,

officers of the A.V.C. could only be called on to intervene on the outbreak, or apprehended outbreak, of contagious disease in Indian units. Indian cavalry, regimental mules, transport corps and camel corps presented problems which precluded their being taken over without great thought and careful arrangement. In the case of Indian cavalry regiments, the animals (excluding, of course, the three non-silladar regiments) and the animals of camel corps were privately owned. It will at once be obvious that it was necessary to proceed cautiously. There were other equally important considerations, such as the disposal of the Indian veterinary personnel of these regiments and corps, ranging from native officers to privates—their future prospects, promotion, and pensions; the willingness or otherwise of the Indian officers and other ranks thus involved to transfer away from their regiments to balance distribution as necessity arose; willingness, in other words, to come on to a general roster for all purposes, as against the single avenue of life in a given regiment.

The Indian veterinary assistants with Indian troops were at this time purely regimental, and were very unevenly distributed, some cavalry regiments having only one or two, whilst others had as many as six or seven. An Indian Army Veterinary Corps was formed, and all these men transferred to it. This corps was administered by the Director of Veterinary Services in India, who was thus enabled to post these men to whatever units he wished. This step set free a considerable number of trained veterinary assistants, who were utilised with newly raised pony and mule corps, with Indian mobile veterinary sections, and in replacement of casualties in Mesopotamia.

Indian Mobile Veterinary Sections and Camel Hospitals.

The war establishments of the Indian Army did not normally contain mobile veterinary sections, but in 1916 Indian mobile veterinary sections were formed on the same lines as the home mobile veterinary sections with their personnel adapted to suit Indian resources and needs. Similarly, owing to military operations in Waziristan in 1917, where over 10,000 camels were employed, it was found necessary to create and organise camel hospitals for the treatment of sick camels.

In March, 1915, frontier troubles broke out with India's old enemies, the Mohmands, and a very determined attack by tribesmen was made on a large force of the 1st (Peshawar) Division sent out to oppose them. These operations do not call for a special report from the veterinary aspect; no special veterinary formation was sent out beyond that invariably employed and detailed in accordance with standing divisional arrangements of the 1st (Peshawar) Division, under which forces are liable to be called out at short notice to defend the frontier, and consequently the full necessary veterinary formations, equipment and stores must always be available for instant use.

At the time of the outbreak of the war, the administration of the veterinary services in India was being carried out by a principal

veterinary officer in India, an assistant principal veterinary officer (the latter usually a captain), and three inspecting veterinary officers. The principal veterinary officer and assistant principal veterinary officer were with the headquarters of the army in India ; the three inspecting veterinary officers had offices on the plains of India ; each administered three or four divisions, but as they were on no recognised staff they were shorn of much useful power and authority, and were often out of touch with each other and with the central administration. In addition to this, according to the Indian veterinary regulations, the senior officer at the headquarters station of the division was designated senior veterinary officer of that division. There were, however, no orders outside the Indian veterinary regulations in support of this appointment ; there were no clearly allotted functions for this officer, and he was never appointed by name or properly accredited to divisional headquarters. This nebulous appointment carried no authority with other units, nor with the divisional staff, each member of which was always correctly accredited.

This state of affairs called for a drastic reform, which was effected with surprising and complete thoroughness. A change in the office of the principal veterinary officer in India brought the veterinary administration in India into line with that of other services as regards staff appointments, and for the first time in the history of the army in India the veterinary service was put on to a satisfactory and level footing. Various attempts had in the past been made to bring about a satisfactory form of administration, and all had, for various reasons, fallen through. The system introduced was that which follows normally the distribution of commands, divisions (or their equivalent designation), and independent brigades, or the designations they may at any time receive.

The third year of the war still saw India with a serious shortage of officers A.V.C., but remarkable efforts were being made in the country to train all the necessary subordinate personnel, below the rank of officer, both British and Indian. Centres were established in which to train the various personnel required for reinforcements to replace wastage in oversea veterinary units, and to complete the establishments of the many new veterinary hospitals and units which at this period sprang into existence. The training of this raw material threw a great strain on the over-depleted veterinary staff, which was working at high pressure in combating disease and endeavouring to control animal wastage. From the European farrier-serjeant down to the humble syce, practically the whole of the other rank personnel required had to be trained and equipped at the shortest notice. This could only be accomplished by the hearty co-operation and loyalty of the staff of the veterinary units which were serving in Indian stations.

Many new remount depots were opened, and these called for very special attention. There were separate depots for horses and mules, but while the horse depots gave comparatively slight trouble, this

was not the case with the mule depots. The mules came from little known parts of the world, such as Tibet, Persia, and lesser known parts of India and the Argentine ; and they were infected with many diseases. The supply of transport animals of all kinds from sources which India could tap was becoming very slender, and every animal that could possibly be utilised was of importance. Frequently there was little accurate information concerning their condition and environment prior to purchase, and little was known of the localities from which they came. The value of information indicating the incidence of disease as affecting animals likely to be absorbed into army use was never more evident, and the lack of it could hardly ever have been more keenly felt. The army veterinary service has to meet any such emergency as this. It must necessarily go to work very warily, and be ever on the alert to recognise all forms of contagious disease. The army in India utilised the generous offer of the I.C.V.D., which supplied mallein for all animals in India. The I.C.V.D. also generously carried out preventive inoculation against rinderpest on all cattle collected for army purposes, such as bullock transport, etc.

At the time of the outbreak of war contagious disease among army animals of the British service in India was practically non-existent, but as regard animals of the Indian army there was little reliable information on which to act. The camel corps was known to be heavily infected with surra and mange, and with many other diseases little known at that time to the average veterinary officer, among which might be included jhooling. As regards the Indian cavalry, owing to their animals being taken by the Indian officers and other ranks when they proceeded on leave, the regiments were constantly in danger of contagious disease.

Owing to the periods during which they were away from supervision, there were large gaps in the history of these animals. On the outbreak of war, when the A.V.C. assumed responsibility, contagious disease was found in many units which could not proceed on active service until they could be given a clean bill of health. In 1917, and more particularly in 1918, enormous demands for trained animals were being made on India from Mesopotamia, the three fronts in Persia, for the North-West Frontier, Waziristan, and Assam-Burma. To meet these demands horses were imported from Australia, and mules from Tibet, via Kalimpong, Persia, and the Argentine ; camels from the various sources in India, which were rapidly used up, and from Persia. The Persian camels that came to India were very satisfactory, and maintained a higher level of health. As the supply of mules waned, ponies were purchased, and were incorporated directly into pony corps. The mules and horses were sent to separate remount depots. The veterinary care of both the mules and the ponies presented great difficulty. Ponies were infected with surra, but the chief diseases in these animals were mange and debility ; many pony corps were not available for service for several months owing to these two preventible diseases.

** Veterinary Operations in Seistan, 1916-17.*

The Seistan Field Force (from India) operated in 1916-17 on the frontier between Afghanistan, Russia and Persia, and its object was to prevent the incursion into Persia of Bolshevist elements.

The mounted units employed with the force and on the lines of communication were as follows :—

28th Light Cavalry	2nd Government Camel Corps
54th Silladar Camel Corps	61st Grantee " "
55th " " "	65th Government " "
56th " " "	

giving a total animal strength of approximately 500 horses and 6,000 camels.

As the country consisted almost entirely of desert regions, with no towns or inhabitants other than nomadic tribes, no local supplies were available, except in small quantities at Nasratabad and a few other places, and the camel was the only possible means of transport. The line from Nushki was divided up into two parts, namely (i) the line of communication from Nushki to Saindak, with base at Nushki, and (ii) Saindak to Birjand, and Saindak to Kwash, with base and G.H.Q. at Saindak.

Apart from transport, the only mounted unit in the force was the 28th Light Cavalry. The headquarters of this unit and one squadron were stationed at Ladis, one squadron at Kwash, and detachments at Saindak, Robat, Dehani, Baghi, Nasratabad, Bandan, Neh, and Birjand.

The veterinary arrangements of the Seistan Field Force in November, 1916, were as follows: There were no officers A.V.C. with the force, and the treatment of sick and the prevention of disease were carried out by the veterinary assistants and dressers of the camel corps under the supervision of the officer commanding the camel corps. The practice was to send a veterinary assistant with the larger convoys and a dresser only with the smaller convoys. An old-pattern camel veterinary chest was sent with each convoy.

This arrangement was bad in the extreme for the following reasons :—

- (i) There was no European supervision on the line of march, the convoys being under the command of a native officer or a native N.C.O., and the vast majority of the veterinary assistants failed under adverse conditions, when left to themselves.
- (ii) The convoys were continuously on the march for two months for the double journey, with halts of one day at each of the following places, between Nushki-Saindak, Nushki-Padag, Dalvandin, Mervi, Mushki Chab, and Saindak.

At no place on the line of march could sick animals be left; and the sick had to go on marching with the convoy until they returned to the camel corps headquarters at the base.

* This report is contributed by Major F. W. H. Thomas, R.A.V.C., who became A.D.V.S. to the Seistan Field Force (see page 355).

- (iii) None of the veterinary assistants of one corps would have anything to do with the sick animals of another corps.

The casualties among the camels of the force at this time (October, 1916) were appalling, and were said to be due to trypanosomiasis (surra). It is no exaggeration to say that it was possible to trace the track across the desert from Nushki to Saindak by following the camel skeletons en route. The mortality had become so great that an A.V.C. officer was specially sent up as A.D.V.S. of the Seistan Field Force to investigate the cause of the abnormal number of casualties among the camels, and to reorganize the veterinary arrangements of the force.

This was carried out as follows :—

- (a) The veterinary assistants of all camel corps were placed under the orders of the A.D.V.S., Seistan Field Force.
- (b) A station veterinary hospital was established at Nushki with a staff of three veterinary assistants (the senior being in charge) and three veterinary dressers. One sarwan for every three sick camels or less was detailed by the corps concerned.

The equipment of the hospital consisted of two complete camel veterinary chests and two microscopes, and a quantity of extra drugs was asked for and supplied.

A duplicate of this hospital, and also a small base depot of veterinary stores, were established at Saindak.

The station veterinary hospital at Nushki was moved up to Dalbandin on completion of the Nushki-Dalbandin railway line.

- (c) One veterinary assistant and one dresser were stationed at convenient halting places on the line of march, and were supplied with a camel veterinary chest and a microscope. These men had strict orders to treat the sick animals of any corps that were left in their charge irrespective of whether they belonged to their own corps or not. Each veterinary assistant in charge had to keep a register of sick and lame animals and a veterinary equipment ledger, and had to submit the following returns :—

- (1) A weekly return of sick and lame animals to the O.C. unit concerned.
- (2) A monthly return of sick and lame to A.D.V.S.
- (3) A notification in writing to the O.C. unit concerned as soon as an animal was admitted to or discharged from hospital.

Under this arrangement, if an animal fell sick on the line of march it was left under the care of the nearest veterinary assistant, and when recovered it was returned to the base by the first available convoy, instead of being marched on day after day with the convoy until it died or had to be destroyed.

Cause of the abnormal number of Casualties among the Camels.

This was found to be due, not to any pathogenic cause, but in the vast majority of cases to the fact that the animals were being starved and the reason of this was as follows :—

1. There were two classes of camel corps with the Seistan Field Force :—

(a) Silladar Camel Corps.

(b) Government and Grantee Camel Corps.

The Silladar Camel Corps were the regular units of the Indian Army. Their personnel consisted of British officers, native officers, non-commissioned officers, and sarwans (camel attendants), who were thoroughly versed in the proper treatment of the camel.

The personnel of the Government and Grantee Camel Corps, on the other hand, consisted of British officers, drawn from Territorial Force units, who had probably never seen a camel before, except at the Zoological Gardens ; native officers and native N.C.Os. from Indian cavalry regiments, and sarwans recruited from every trade and calling except that of the true camel man. The result of this can be clearly seen in the attached table of casualties for the month of December, 1916, and January, February, March, April, and May, 1917, the rise in the casualties of the 54th Silladar Camel Corps for April and May being due to surra, as this corps was working in the fly area during those months.

2. The grazing grounds were on an average five miles distant from the halting places. Nowhere on the line of communication or in Seistan itself is the grazing so luxuriant as the grazing grounds of the Punjab. Water in most places is bad, being brackish and unpalatable, good sweet water being obtainable at very few halting places ; and it must be borne in mind that the Punjab camel is a very much larger animal and accustomed to far better grazing and water than the indigenous camel of Baluchistan, which is smaller and is brought up on sparse grazing and brackish water.

As a result of this combination of inexperience of the personnel of the corps and the sparse grazing and brackish water, and the little time available for grazing, owing to the distance of the grazing grounds from the halting places, the camels were never properly grazed and watered. Also apparently no time was allowed for the animals to ruminate, with the result that they were gradually starved, and if they did not eventually die, they became so weak and emaciated as to be quite unfit for work.

The number of saddle sore backs and galls among the camels of the force was appalling. At Saindak there were 250 cases of this kind out of a total strength of 523 animals, and in a large number of cases the injuries were so severe and of such long standing that the wretched animals had to be destroyed.

The causes of this state of affairs were again the inexperience of the personnel and its lack of supervision, resulting in sarwans and sepoy riding on loaded camels on the line of march, camels being

badly loaded, the loads not being properly balanced, heavy stones being tied on to correct the balance, badly fitting and inferior palans (camel saddles). The effect of such treatment was aggravated as the animals were in an emaciated condition, and no proper veterinary treatment had been available in the early stages of the injury. Apart from insufficient nourishment and galling, there appeared to be no cause to account for the large number of casualties. There was very little disease among the animals of the force with the exception of surra.

The whole area from Nushki to Birjand is practically waterless with the exception of the area in which Hamun is situated, and water can only be obtained from usually one water-hole at each halting place. Consequently, as tabanidae are never found far from water, it is unlikely that they were ever present in sufficient numbers to be a source of danger anywhere in the Seistan Field Force area, except possibly in the locality of Ladis and Kwash.

During the fly season, which commences about April, tabanidae literally swarm in the vicinity of the Hamun, and surra is very rife. It is a significant fact that the local camel men will not cross the Hamun during the fly season.

During the period from April 14th, 1917, to June 30th, 1917, there were 111 cases of surra diagnosed in the Robat to Bandan area, of which 23 died, 1 strayed, and 87 remained working in the fly area. On the Saindak-Kwash line there were 17 diagnosed cases of surra, all of which were destroyed to prevent the spreading of the disease.

Biting flies caught and recognised in the Seistan Field Force area included the following:—

Tabanus persis. *Hippobosca cameli.* *Haematobia.*
Tabanus orientis. *Stomoxys calcitrans.*

Statement showing the Total Camel Casualties of the Transport Units serving with the Seistan Field Force for the months of December, 1916, January, February, and March, 1917.

Unit.	Dec., 1916.	Jan., 1917.	Feb., 1917.	Mar., 1917.	Total.	Remarks.
61st Grantee C.C.	20	50	41	19	130	Arrived here 23/2/17. Three troops working with S.F.F. since 1/2/17.
65th Govt. C.C...	64	90	43	137	334	
55th Silladar C.C.	2	—	—	12	14	
56th Silladar C.C.	—	—	—	1	1	
2nd Govt. C.C. ..	73	—	—	—	73	Died of pleuro- pneumonia.
54th Silladar C.C.	—	—	—	1	1	
Totals ..	159	140	84	170	553	

Note.—The sudden drop in the casualties of the 65th Government Camel Corps from 137 in March, 1917, to 26 in April, 1917, is due to the fact that this corps was sent back with its sick animals to the base during the latter month to recuperate. The 26 animals remaining at Seistan were unfit to march with the corps at the time and rejoined the corps later.

Statement showing the Total Camel Casualties of the Transport Units serving with the Seistan Field Force for the months of April and May.

Unit.	April, 1917.	May, 1917.	Total during two months.	Remarks.
54th Silladar C.C. ..	23	31	54	Captured camels, 10 in number, are all sick in Saindak Vet- erinary Hospital.
55th Silladar C.C. ..	14	12	26	
56th Sillidar C.C. ..	1	1	2	
61st Grantee C.C. ..	13	5	18	
65th Govt. C.C. ..	26	9	35	
Captured camels, at- tached 54th C.C.	—	6	6	
Total	77	64	141	

CHAPTER XV.

THE VETERINARY SERVICES IN ITALY.

Move to Italy and Concentration.

AFTER the enemy had successfully launched his offensive at Caporetto in October, 1917, the Italian forces were obliged to retire across the Venetian Plain to the Piave. In order to assist their ally, the French and British armies in France each sent to Italy an expeditionary force, part of which remained to take part in the final defeat and rout of the Austrian army in October, 1918.

The British troops sent to support Italy comprised chiefly formations and units from the XIth and XIVth Army Corps, under the command of General Sir Herbert Plumer.

The French force took the northern route via Mt. Cenis-Modane-Turin-Verona-Vicenza, the British moving via the Riviera-Genoa-Voghera-Mantua.

The XIVth Army Corps, commanded by Lieut.-General the Earl of Cavan, was the first British formation to reach Italy, and completed concentration by December 4th, 1917, in the Padua area. In order to relieve railway traffic congestion during the move, some units were detrained at Nice, marched along the coast and re-entrained at Savona. The animal strength of the corps was 17,960.

The A.D.V.S., XIVth Army Corps (Major H. S. Mosley), obtained much valuable information by preliminary reconnaissances and made good veterinary dispositions before the arrival of army headquarters.

The XIth Army Corps, Lieut.-General Sir R. C. B. Haking commanding (A.D.V.S. Major R. C. Cochrane), composed from formations and units in France (Bethune sector), followed the XIVth Army Corps, entrained between November 28th and 30th, 1917, and detrained in concentration area to the right of the XIVth Army Corps on December 3rd, 1917, with the exception of the 5th Division which followed 14 days later. All units were railed through to the concentration area. The strength in animals was 7,949.

The army headquarters, army troops, and lines of communication units had an animal strength of 2,685.

The British force took up at first a front on the River Piave, between the XXIst Italian Army Corps on the left and the XXIIIrd Italian Army Corps on the right. This front was maintained until March 30th, 1918, when the operation entered on the second phase in the mountain sector (Asiago plateau).

The directors of administrative services and departments were to be located at G.H.Q. and not at H.Q., I.G.C. (a departure from the spirit of Field Service Regulations, Part II, but in accordance with the system recently adopted in France), thereby necessitating a subordinate representative of Army Veterinary Services at H.Q., I.G.C., for the lines of communication. This was one of the many lessons learnt during the experience of a large scale war.

Animals were sent by train from France during the months of October, November and December ; their time on rail occupied approximately five days. Some animals had already been clipped.

The ventilation of the trucks was carelessly controlled, and on leaving the genial climate of the Riviera a sudden fall in temperature occurred in the ascent over the Ligure into the cold plains of northern Italy, causing the animals to become exposed to great risks from chills. The troop trains ran without a time-table, one following close upon another ; halts were consequently made spasmodically and at irregular intervals, and could only be relied upon with any degree of certainty at the official halting places, where men's meals and ablutions took up most of the short time allotted. The animals travelled harnessed and saddled up ; rugging up en route was therefore out of the question and impracticable ; some trucks were overcrowded ; for instance, eight instead of six heavy draught horses had been put in cattle trucks. Under such conditions it was not surprising that pneumonia should result, as it did, and that latent cases of mange should find ideal conditions in which to develop.

On the conclusion of the move, 76 cases of pneumonia occurred, 39 proving fatal. The 41st Division contributed 60 of the number, and of these 50 per cent. died.

Owing to the food stringency at home the supply of bran as a horse ration was at this time very short. In spite, therefore, of all efforts to obtain it, very little was available for the train journey, and dietetic troubles resulted.

During the march, after the long train journey, laminitis supervened. This inevitably occurs if horses are put to work before the circulatory system of the feet has been restored after a period of forced inertia and unsuitable dietary.

The cavalry, after detainment near Savona, picketed their horses near a row of acacia trees (*Gaggia pseudo-acacia*), but fortunately only a small proportion of the bark was eaten : 6 horses died and 46 others were seriously ill. There being no veterinary officer with the regiment at the time, Tenente Veterinario Ramilla, of the Italian Army Veterinary Services, attended the cases with considerable technical skill.

During and immediately subsequent to the railway journey from France there were 37 cases of digestive derangement, and 19 of these proved fatal. Most of the cases occurred among the horses of the artillery brigades of the 41st Division.

This abnormal incidence of gastro-intestinal disease was attributed to the unsuitable diet, the irregular feeding and watering, and the ingestion of sand when the animals were picketed on the sand dunes near Dunkirk while awaiting entrainment.

During the period of concentration, from November 16th to 29th, 1917, 436 cases (3·76 per cent. of strength) came under treatment ; of these, 140 (·88 per cent. of strength) were cured, and 61 (0·38 per cent.) succumbed.

A number of sick horses which were unable to march with units and had been left with the inhabitants were collected later ; they had in every instance been well cared for.

The first experience of our horses on the roads of northern Italy was somewhat alarming, and credit for skilful driving is due to the units which pushed on by forced marches on the main roads whose surface resembled polished marble. The material used for road repairs is taken from the neighbouring river beds into which it is washed down by floods from the mountains. The second-class roads and those nearer the line were less dangerous. The Italian animals were shod with specially wide shoes with heel calkins, toe-pieces being also worn for work on mountain roads, tracks and ice. The winter conditions in the plains were favourable to our horses. The horse-lines could be kept in good order, the rainfall was light, and practically no snow fell.

First Phase—December 5th, 1917, to March 30th, 1918.

The British force occupied the Montebelluna Piave sector, the XIVth Army Corps on the left extending from the Montello plateau along the right bank of the Piave river from Crocetta to Nervesa.

The physical feature of the sector was a plateau, the Montello, jutting out from the banks of the river and standing 500 ft. above the plains and extending $7\frac{1}{2}$ miles from east to west and $3\frac{1}{4}$ miles north to south. No animals were located on the Montello.

The soil, which was light loam with a gravel subsoil, made good standings for horse-lines ; water was good and abundant, though the streams were invariably frozen in mid-winter. The wagon lines of the forward area were distributed along the southern base of the plateau, and the majority of the animals stood in the open.

During the greater part of the day there was, with rare exceptions, brilliant warm sunshine, though the shade temperature was low. The nights were bitterly cold. These variations of temperature were very trying, but the majority of the animals suffered very little on this account.

On the 12th December, 1917, the XIVth Army Corps had 300 sick animals to clear and experienced difficulty in getting an allotment of transport as returning supply trains could not be halted at Pavia or elsewhere for off-loading.

The Italian railway authorities did not at first recognise the necessity for the evacuation of sick animals by rail, considering it to be a waste of coal, rolling stock and sidings, and suggested that some other way of evacuation, e.g., by road, might be utilised. This was of course impracticable with veterinary hospitals 137 miles from the zone of operations. This view disclosed the variance between the Italian and the British veterinary hospital organizations. In the former, veterinary units are located within the army areas and the personnel for these units is obtained from regiments. Such a policy is technically unsound since, on a retirement, the sick

animals would be lost, as railway transport would certainly not then be available and the roads would be congested with traffic. Further, the Italians could feed their sick by local requisition in the forward areas. The principle of "the nearer the base for veterinary hospitals the better" was especially applicable when not only was there no prospect of a lengthening but a possibility of a shortening of the lines of communication.

At first sight it would appear that as empty supply trucks had to return to the base it would have been an easy matter to take sick horses in them and thus obviate the necessity of arranging for special sick-horse trains. The objection, however, to this arrangement was that the use of odd trucks for sick horses entailed shunting and re-assembling, which interfered with the normal time-table and disorganized the supply train by detachment of its component vehicles. Consequently special sick-horse trains were eventually organized.

When two army corps were in a line, a proportion of the train accommodation was allotted to meet the evacuation requirements, the portions joining to form one train at the regulating station. The first sick-horse train evacuated, on December 20th, 1917, 200 sick to the advanced veterinary hospital at Pavia, 175 miles distant, but the distance and the time taken were shortened when No. 22 Veterinary Hospital was opened at Cremona. The usual time-table was entrainment of XIVth Army Corps sick at Montebelluna, 4.19 p.m., picking up trucks of sick from the XIth Army Corps, which had entrained at Istrana, near Treviso, and arrived at 3.36 a.m. at the reception (No. 22) Veterinary Hospital at Cremona, a distance of 137 miles, the journey taking 11 hours 37 minutes.

These composite sick-horse trains, up to a thirty-truck limit, were run as often as required, though not oftener than once a week, the portions from the XIth and XIVth Army Corps joining up either at Castlefranco or Citadella.

The documents employed when sick animals which were unable to proceed with their unit were left on the line of march with the inhabitants were revised.* The details were made clear by printing the Italian translation above the English instructions. When sick animals were left with inhabitants in reserve areas it was necessary to report the fact to the local O.C. troops (Commando di Tappa), who was empowered to commandeer forage and to get an allotment of forage rations; when this procedure was impracticable application was made to the sindaco, a similar civil official to the maire in France.

A liaison with the Italian authorities was established, and Capitano Dott Veterinario Leonardo Grassi, M.C., Italian Veterinary Services, was placed at the disposal of the D.D.V.S.

* See Table A on page 383. In these as well as other matters the great assistance given by General Ragioni of the Italian Intendenza, attached to British G.H.Q., is gratefully acknowledged.

Capitano Dott Veterinario Leonardo Grassi, M.C., also rendered invaluable assistance.

Owing to a coal shortage, cold-shoeing in its strict sense was obligatory, with far from satisfactory results in the case of large-sized shoes.

In a winter campaign, every trooper and driver should be trained to apply frost cogs. On one occasion the farriers of a R.F.A. battery took two hours to rough the horses of the unit ; fortunately time could be spared for the work.

The horse-masters or advisers appointed in France accompanied some units to Italy.

Courses of one week's duration in horsemastership were given in the XIVth Army Corps area to junior officers by the A.D.V.S. in conjunction with the corps horse adviser. Later, similar courses were held by D.A.Ds.V.S. of divisions to officers and N.C.Os in their respective divisions.

The course included also veterinary sanitation and disinfection, the fitting of saddles and harness, veterinary first-aid, march discipline and equitation.

In February, 1918, recommendations were made by the veterinary directorate, in view of a corps being held in readiness to move into a mountain sector, on the precautions necessary to prevent pack-saddle galls, the principles of special shoeing, and the carriage of drinking water for animals.

Wastage.

Battle Casualties. The battle casualties in animals were, during this phase, only 26 killed and 45 wounded. The enemy's chief method of offensive was nightly air raids.

Mange was prevalent during December, 1917, and January, 1918, chiefly among units whose animals had not been clipped before leaving France.

On March 20th, 1918, a conference was held at Battaglia, comprising Colonello Veterinario Costa Uff Dott Alessandro, Inspector of Veterinary Services of the Italian Intendence General, Colonel Meyranx, D.V.S., French Army, and Colonel F. W. Wilson, D.D.V.S., British Forces in Italy.

Several matters were discussed, and an agreement was arrived at in regard to the necessity for an improved control of contagious and infectious diseases, of which the following forms were agreed upon to be notifiable :—

Glanders, epizootic lymphangitis, ulcerative lymphangitis, mange, anthrax, rabies, influenza, and foot-and-mouth disease.

It was further agreed that not only should such outbreaks be inter-communicated between the directors of the army veterinary services of the allied forces, but that, wherever an outbreak occurred, a poster showing the disease, printed in three languages, should be placarded on the premises concerned.

Second Phase—March 31st to October 15th, 1918.

On the approach of spring, 1918, the enemy became active on the Piave front. The British line moved a little north between

French forces on the right and Italian forces on the left. The area was triangular in shape, with its apex at Thiene and its base on a line Caltrano-Camisano-Calvene-Lugo-Fara. With the exception of a few open spaces along the banks of the river, where there is a gravel soil, the country in this area is very fertile, highly cultivated, and planted with maize, wheat, oats and lucerne, intersected with rows of mulberry trees linked with vines.

The units made permanent standings with round stones* from the river bed, and kept the horses from the river banks because of the danger of sudden floods. In the summer, units erected temporary shelters as a protection from the sun.

The plateau, which is about 1,250 metres (approximately 4,100 ft.) above sea level is covered with rocks. Shelter by pine trees was utilized about Granezza (right sector), where there were also a number of Italian wooden stables with floors well laid with stone (an art in which the Italians are past masters). The Italian units had bedded down on the continental system. The plateau of the left sector was more exposed, especially at Carriola, there being very little shelter, and at first the animals had a rough time.

In summer there is good grazing on the plateau. There were only two principal roads leading up to the top plateau; the right was about 35 kilometres in length, past Salcedo-Velo, Scissere (a halting stage), Piazza, Granbezza, and was used also by the French and Italian troops. On the left the road from Caltrano passed through Campiello (a railhead for the mountain railway and the Teleferica) to Carriola. The road was in good condition, with sharp hair-pin turnings and steep gradients.

A veterinary evacuating station was established at Thiene, clearing sick animals from the division on the right sector through a veterinary aid post at Granezza, and conducting them by mule track to its mobile veterinary section at Fara, whilst casualties from the left sector passed through the veterinary aid post at Pozzodel Favaro and at Mont Serona by road to the mobile veterinary section at Camisano. The sick animals of the division in the Trissino rest area, 20 kilometres south of the veterinary evacuating station, were cleared independently by its mobile veterinary section.

A central veterinary dressing station, established for infantry brigades in the line, did good work, and was the pioneer to others at a later phase of the campaign. As the distance between the advanced wagon lines and the mobile veterinary section was often considerable, the headquarters of this unit were established in the plains, maintaining a veterinary aid post, whilst in some places additional posts were instituted at or near the transport halting stages. For these duties the personnel of the unit was increased by 25 other ranks, A.V.C. The sick of the veterinary aid post were passed by relays to the next veterinary aid post in its rear, and so on to the mobile veterinary section. Stabling or shelters for four or five animals were constructed at each of these posts.

* This also served as a precautionary measure against sand colic.

After first aid had been rendered, and the registration of cases accomplished, groups were moved either by road or by mule tracks almost straight down the mountain, then across a series of zig-zag roads, thus shortening the distance and ensuring the avoidance of traffic. The steep gradients were well negotiated.

Co-operation was practised between the allied formations irrespective of the "nationality" of the casualty, and during this phase of operations 84 animals of the French and 929 of the Italians received attention in addition to 4,443 British.

The veterinary evacuating station conducted to the base 1,078 animals, an average of 60 a week. The sick for evacuation to hospital from the division in reserve were entrained independently from the divisional supply railhead.

The question of risks from gas was considered, as such risks were always a possibility on mountain roads, especially from mustard gas. A pamphlet on the precautionary and first aid measures to be adopted was drawn up, and it was pointed out that a horse's coat impregnated with mustard gas products is a source of danger to men.

A certain number of casualties in the horse lines were caused during this period by enemy bombs, particularly "stick" bombs, which burst close to the ground and distributed fragments at the level of the animals' limbs. Protective banks were thrown up as close to the animals as practicable with good results.

During March-April, 1918, a reduction of the force commenced; the 41st, and later the 5th, Divisions and the Army Brigades R.H.A. and R.F.A. returning to France, leaving the 7th, 23rd and 48th (South Midland) Divisions. The command of the British forces now passed to Lieut.-General the Earl of Cavan.

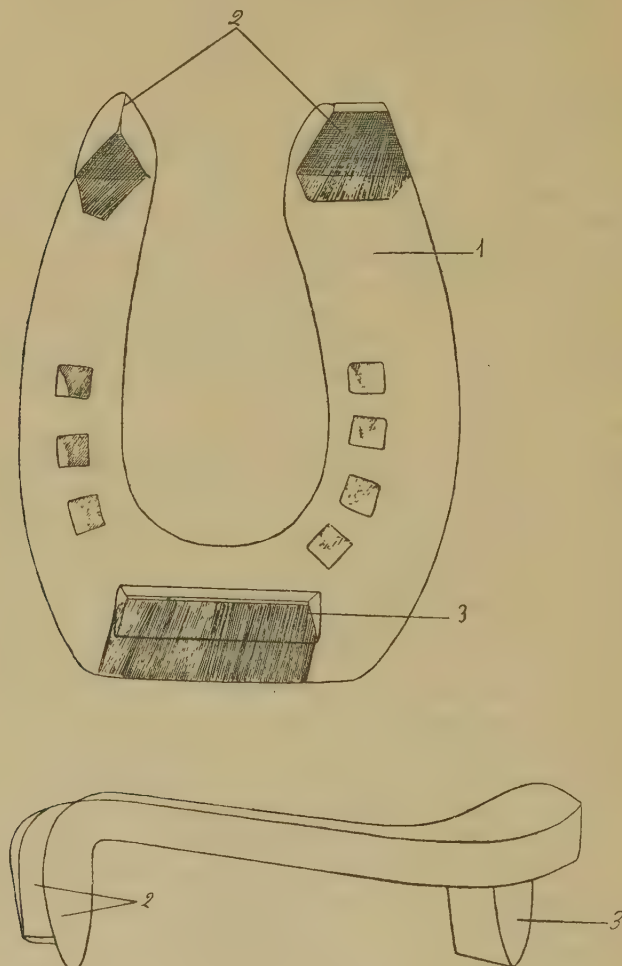
On taking over a mountain sector a change of shoeing to suit the altered conditions of surface became obligatory. The senior N.C.Os. of forge establishments were sent to No. 22 Veterinary Hospital to be instructed in the technique. After searching enquiries and experiments had been made with a view to avoiding if possible the difficulties attending the introduction of a new pattern shoe, it was decided that a change was unavoidable, and a supply according to a new specification and models was demanded in March, 1918, from home.

The new pattern shoe offered a wider bearing surface, and projected beyond the wall by $1/32$ nd to $1/16$ th of an inch, and the nail holes were stamped correspondingly coarse. The thickness of the shoe, corresponding in size to the British 14 mule shoe, was 80 millimetres, and to size 15 mule, 90 millimetres; nails of size $7\frac{1}{2}$ were used. (See plate.) These innovations caused the farriers great anxiety when nailing on, but with practice they became expert.

The Italians use various patterns, but the simplest has large toe clips turned towards the ground surface, two quarter clips and fixed calkins, the outside one set in a transverse direction, the inner being longitudinally placed; the toe pieces for winter use are made

of steel. Considerable forge work is entailed, and shoes from contractors are hand-made. The toes are bluntly square. Special nails are not required.

MULE SHOE FOR USE IN MOUNTAIN WARFARE.



1. Outside sole of the shoe.
2. Fixed calkins, the outside calkin transverse, the inside calkin longitudinal, in respect to the shoe.
3. Studs of prismatic shape welded to the shoe.

Captured Austrian pack ponies were shod with double fullered shoes having a large square blunt cog at each heel and a toe piece.

A supply of shoes was obtained through the Italian authorities to commence with, and used for mules.

Facilities to study the system were afforded by the courtesy of Lieut.-Colonel Bertetti, Director of Veterinary Services, 3rd Italian Army, and a British senior N.C.O., A.V.C., was attached to an

Italian unit to obtain practical experience of the method. The D.D.V.S gave a demonstration to 100 farriers.

The equipping of the mules selected for work on the plateau was of the first importance, after which the horses and mules working on the roads from the plains to the plateau were dealt with. Two sizes for horses and mules were arranged for, and a preliminary issue of the special shoes was received from home as early as May 22nd, 1918; these were far better finished than those obtained in Italy. It was contemplated at that time that our animals would be in the mountain sector all through the following winter.

To prevent snow from balling in the feet, a leather sole was considered, but at the time the supply of leather was at a premium. Had provision been necessary a substitute would no doubt have been found. Grease was, however, found useful as a preventive.

Heavy draught horses were employed in the plains to take supplies from the railhead at Villaverla to the divisional refilling points. On the right sector the three divisions conveyed their supplies to the plateau in general service limbered wagons, one train working between the plains and Sciersere and the other between Sciersere and the plateau. On the left sector most of the supplies were taken to Campiello on a light railway and thence to the plateau by light limbered wagons. The pack animals worked on the plateau between the brigade refilling points and units. At each of the staging halts a dresser, A.V.C., was posted to inspect the animals for harness galls and to render first aid.

The three main roads, used also for motor traffic, were generally in good surface condition, of moderate gradients with hair-pin bends, where especially good driving was essential, and approaching traffic was obscured often by the hillside.

Of the 12,000 horses and 4,000 mules located in the forward area, 3,000 lived on the plateau and 1,500 in each of the divisional wagon lines.

The mules were naturally more amenable to pack work and mountain conditions, and became the more readily acclimatised. The pack work was done exclusively by them. An increase of 40 mules a battalion was made, and the horses and remaining mules were employed on draught work in the plains and on the approaches to the plateau. The heavy draught horses normally remained in the plains, but some Pontoon Park R.E. heavy draught horses worked up the plateau.

It was necessary to train the animals to a high degree of physical fitness before they could endure the strenuous uphill work in circumstances of altitude and temperature to which they were unaccustomed. Similarly, hard bodily condition was necessary to counteract the effects of concussion to the joints of the limbs in downhill work. It was, however, more than could reasonably be expected of heavy draught horses, though the exigencies of war rendered this effort on their part necessary.

At the halting stages animals were taken out and watered, and the vehicles were changed over to another relay, the work on this staging or dak system extending over about six hours. It was lighter and more regular and preferable to going the whole distance to the plateau, because if the distance was covered in one day, it meant eight hours' hard pull for the animals, which arrived hot and tired, and then had to pass the cold night in the open, returning to the plains the next day and resting on the third day. Animals returning to their own lines were not subjected to any change of stable routine. The feeding arrangements were simpler and under better supervision; the chopping and changing of animals was also avoided. It happened occasionally, however, that mules, working in draught, hauled stores to the plateau and returned the same day, doing the 38 miles with very little water, the duty lasting 14 to 15 hours.

Pack mules, working on bridle paths usually allotted to the carrying of small arm ammunition, were able to go to the plateau quite easily and return the same day to the plains, taking $3\frac{1}{2}$ hours to ascend and $2\frac{1}{2}$ hours to return. Each pack mule carried a 200 lb. load, inclusive of 40 lb. pack saddle.

When on pack duty, one man was allowed for each mule in accordance with Italian practice.

As an example of the mule's capabilities as a worker, 20 mules of a battalion, shortly after the commencement of the Austrian offensive, worked on the plateau eighteen hours a day for eight days. They carried 500 screwed pickets, 600 rolls of wire, changed four water dumps (240 tins at each dump), battalion rations and water (500 gallons of water daily), and changed small arm ammunition and light trench mortar dumps. They lived forward, and were worried at night by shell fire.

The Italian system was to work the animals on alternate days for about nine hours; they were groomed only on non-working days, when several hours were devoted to it. On non-working days the mules were taken out of the stables and linked in a ring with their heads inwards, a common and useful practice in northern Italy.

March Discipline.

Our drivers soon learnt the difference between mountain work and riding with a convoy on the level. At first they were not so good in keeping the whole team in draught as either the French or the Italians. The French with their eight-horse teams were splendid in taking the hair-pin turnings uphill; every trace was taut; horses and men were all bent on their task.

Patrols to regulate traffic and enforce march discipline were posted on the roads. Going uphill the wheel blocks were always trailing so that a halt could be called at any time. Frequent short halts were encouraged. Going downhill the pair of leaders were taken out, and a man walked behind the wagon to operate the brakes.

Saddlery and Harness.

The Indian pack saddle was used, and there were no cases of sore backs attributable to the saddle itself. Sore withers were caused by using a saddle blanket under the saddle ; the blanket worked down causing a dead pressure on the withers, and decreased the width of the arch. Units which did not use a saddle blanket remained free from saddle injuries. The Italians joined the upper edges of the two panels with a strip of loose leather running the whole length of the saddle, so as to form a covered arch over the backbone without touching it and prevent foreign bodies working down between panel and skin. This method was adopted by us and, when leather was not procurable, canvas was used with satisfactory results.

The Indian pack saddle weighs about 40 lb. ; the Italian is 10 lb. heavier, and is excessively padded, with a tendency to narrow the width of the upper part of the saddle. The girth is fastened by a leather thong on a ring, which at first our troops found difficult to adjust.

Other injuries were due to adjusting wrongly the various strap-pings of the pack saddle. For example, the double girths were not crossed, the breast strap and breeching were left too loose, and the cruppers were not used. This neglect caused oscillation and displacement of the saddle, producing uneven weight when the mules moved up or down the steep slopes. A pack school was established at Luvigliano, and did a great deal to enlighten the novices in mule pack work.

The animal transport was at a disadvantage in the early stages of operations for the want of mule harness ; units had to make shift with horse harness ; the breast band was so wide that it interfered with the play of the shoulder, causing a gall. Again, at one time it was the old story of new harness and new animals. As a means of preventing galls, a veterinary aid post was established at or near each halting stage. The veterinary personnel inspected all animals, paying particular attention to the animals' shoulders, and dressed them when necessary, if tender, irrespective of the surface not being abraded. Any animal actually galled was either thrown out of work or its work changed. In this way during the whole time the British force was in the mountain sector only minor cases of galls occurred, and not a single animal suffering from a saddle or harness gall had to be destroyed as incurable.

Rations.

During the spring of 1918, in view of enemy submarine activity, the forage rations had to be reduced by 2 lb. of oats. This was particularly hard on the light draught mules doing pack work, since, in view of their work being now " pack " irrespective of their size, they became automatically graded on a lower scale from the point of view of rations until they received a daily grain ration of only 4 lb. This was found insufficient, and the matter was adjusted by a reclassification of mules and by an order to grade for rations

all mules over 15 hands as light draught. The normal supply of rations at full rate was fortunately restored after a short time, and the hay ration was increased to a flat rate of 12 lb. which included substitutes such as straw, lucerne, and green fodder.

At one time the hay ration was composed of 50 per cent. straw, but this was later reduced to 25 per cent. as it was observed that the large percentage of wheat straw lowered the digestibility of the food and was the cause of impaction of the bowels and debility. The quality of the forage was not always good. When grazing and green fodder were available on the plains and the weather was severe on the plateau, the greater part of the hay ration was sent up there for the animals working under great disadvantages.

Water Supply.

In the plains there was no shortage of water, the river Astico being the main source of supply. The water was cold and not always appreciated by the horses. At the halting stages at Scieserre and Cava le Tese water was plentiful. On the left road there was no watering place at Campiello, and units working on this road had to carry the water for their animals in petrol tins; as a matter of fact, there was a standing order to the effect that water should be carried on all transport work up the mountains in case it should be required.

On the plateau there was no scarcity of water on the right sector; there being a large pond at Granezza, which was wired and the water pumped into troughs. On the left sector there was at times a scarcity of water, but with the construction of tanks in catchment areas there was never a serious shortage. Precautions were taken to prevent troops from watering their horses at the public troughs in villages and at Scissere. As a means of preventing sand colic, units were supplied with water troughs, and the water for drinking was pumped through a filter.

April, 1918, was a particularly cold, wet month, and even the animals on the plains suffered more acutely than during the winter on the Piave. In the spring there is a marked fall of temperature at sunset, which is very trying for the animals, particularly those working late in the afternoon. During the summer months the animals thrived better on the plateau than on the plains, owing to a cooler climate, plentiful grazing, and the absence of flies; animals when first brought down from the plateau fell off in condition.

With regard to the flies, these were identified as the *simulium equinum*, a biting fly usually found near water, especially where shaded by trees. They fly in swarms towards sunset, and feed on vegetable juices. The females bite domesticated animals on the parts where the skin is fine and destitute of hair, such as the inside of the thighs, though the most favoured place is the interior of the ear. The bite is small, but causes severe irritation, often with inflammation and shedding of the hair. In addition, they are suspected to be carriers of piroplasms or other pathogenic organisms.

Although it is difficult to cope with the insanitary conditions prevailing in an Italian village, the best results were obtained from smoke fires generated from refuse or dead leaves, ignited in a brazier or old bucket, and kept burning day and night in the horse-lines.

Debility.

8·53 per cent. of the horses and 7·53 per cent. of the mules in the forward area were evacuated to the veterinary hospitals for debility. There is no doubt that animals advancing in years felt the strain of mountain work and the change of altitude, though other contributory causes may be mentioned, e.g., reductions of rations in the spring, a large percentage of straw in lieu of hay, and temporary shortage of water.

Animals with lung and heart affections were quickly discovered in this kind of work. It is an error to suppose that because the work is carried on at a walking pace it is possible to condition animals in the mountains; they must be physically fit for hard work before they are sent on mountain work. Local customs are worthy of study in this respect.

During this phase 62 animals were killed by shell-fire and 99 wounded (35 seriously). The majority were animals working between the wagon lines and the unit; others were killed in the wagon lines. Two gas cases were reported.

Detailed recommendations in respect to the entrainment of animals and train journey arrangements were issued in view of the fact that troops were being withdrawn to France. The following are the main points, viz. :—

1. Not more than six heavy draught horses to be put in each truck.
2. Oats not to be given for the first twelve hours of the journey.
3. Tails to be bandaged and, when practicable, before animals are entrained.
4. Importance of good ventilation; attention drawn to the occurrence of pneumonia on the move to Italy.
5. The door of the running railside to be kept closed. Water in quantity up to 24 gallons to be placed in the trucks in any clean available receptacles.
6. Cooking or fires of any description forbidden in the horse trucks.
7. Horses to be entrained by their own drivers and not by a fatigue party.
8. Great care to be exercised in securing animals safely in the trucks. Numerous accidents had occurred owing to the lack of this simple safeguard.

Third Phase, October 16th to November 4th, 1918.

Battle of the Piave or Vittorio-Veneto. The 7th and 23rd Divisions, less the 48th Division (attached to XIIth Italian Army Corps in the line on the Asiago plateau), comprised the XIVth British Army

Corps about to be engaged on the Piave front from Salletol to Palazzon alongside the XIth Italian Army Corps* forming collectively the 10th Army placed under the command of General the Earl of Cavan. The objective of the 10th Army was to reach the River Livenza between Portobuffole and Sacile, protecting the 8th and 12th Armies, which, with the 10th, were to drive a wedge between the 5th and 6th Austrian armies—a task which was achieved and contributed to the victory and complete collapse of Austria. The mobile veterinary sections were moved with their divisions.

It was contemplated that, in the event of the attack being successful, a considerable advance would be made. On the east side of the Piave rail facilities for the evacuation of sick animals could not be relied upon. The policy on which veterinary arrangements were based, therefore, was the despatch of sick animals in convoys by easy marches to the advanced railhead (Spreziano) or their retention near supply railheads or dumps until railway communications could be restored.

The 12th Mobile Veterinary Section (Capt. J. M. Dawson, 7th Division) made a great advance via Limbraga (October 20th), Belussi (November 1st), Sacile (November 5th) to Pordenone (November 3rd), establishing a veterinary aid post at San Giorgio on the River Tagliamento.

The 35th Mobile Veterinary Section (Capt. R. C. Allinson, 23rd Division) reached Ronche (November 3rd), via S. Bona (October 24th), Lovadina (October 30th), Cimetta (November 1st).

The veterinary aid posts of the 1st South Midland Veterinary Section (Capt. J. C. Gaunt, 48th Division) were established at Granezza (November 2nd), Asiago (November 3rd), and Postule (November 4th).

The western channel of the Piave to the island of Papadopoli was crossed on the night of October 23rd–24th and completely captured by night on October 25th–26th, and on October 27th the allied army was on the line Stabiuzzo–S. Polo di Piave–Tezze–Borgo Malanotte.

The enemy, after fighting strong rearguard actions on the River Monticano and at the village of Cimetta, retreated on the Conegliano–Pordene road, which was continued further.

Owing to the complete rout and capitulation of the enemy few animal casualties occurred, and the mobile veterinary sections of divisions were fortunately able to handle their sick.

The animal casualties for the Piave battle, called by the Italians the battle of Vittorio–Veneto, numbered 39 killed and 35 wounded; whilst for the whole period October 24th to November 4th, 1918, 117 were killed and 223 wounded.

Between October 16th and 31st the veterinary aid posts dealt with 408 cases, of which 91 were Italian and 8 French; whilst during the period June 1st to November 7th, 1918, 929 casualties of the

* The command of the XVIIIth Italian Army Corps was added later in the operations.

Italian army and 84 of the French army were dressed and cleared, in addition to 4,443 of British units, making a total of 5,456.

On October 23rd, 1918, the veterinary evacuating station moved from Mestre to Treviso, and established subsequently, owing to the rapid advance of our troops, an advanced veterinary post near Spreziano railway station on November 3rd. Animals were received at this post, and, after first aid, were passed by road to Treviso, a distance of 13 kilometres. This it continued to do until November 14th, when it was withdrawn to Treviso, as all units had by then recrossed the River Piave.

The veterinary evacuating station and the field remount section handled the animals captured (about 2,500). They were malleined, overhauled, classified for retention, sale, transfer to veterinary hospital or salvage. This work entailed additional strain on the veterinary evacuating station while it was actually receiving and evacuating the normal sick and wounded animals. During the period October 16th to December 12th—eight weeks—939 horses were admitted (excluding captured animals) of which 853 were evacuated to the base.

Latterly the mobile veterinary sections cleared their sick animals direct to the reception veterinary hospital.

On conclusion of these duties the veterinary evacuating station dealt with, at Montecchio Maggiore, the disposal of group "D" animals in addition to its normal work.

The military value of horse transport compared with mechanically driven vehicles was well exemplified when it was necessary for the advancing force in pursuit of the enemy to cross the River Piave, on account of the bridging difficulties across the river while in flood. The bridge comprised pontoon and trestles to an extent of three miles from bank to bank, excluding the intermediate island. It was not until several days after the last horse vehicle had crossed that the bridge was made sufficiently strong for the passage of motor lorries, and even then it was only strong enough for light lorries.

Veterinary Hospitals.

Preliminary veterinary dispositions of units, A.V.C., had been made by the A.D.V.S. of the XIVth Army Corps (Lieut.-Colonel H. S. Mosley) before the army headquarters assumed command of the force on December 6th, 1917, and the reconnaissances of possible sites for veterinary hospitals gave valuable information.

The British general headquarters were established at Padua (Padova), with a long line of communication extending to Genoa, the headquarters being at Mantua (Mantova) and subsequently at Tortona. A liaison was established with the Directorate of Italian Veterinary Services in the person of Colonello Veterinario Costa Gr., Uff. Dott. Alessandro, Inspector of Veterinary Services of the Intendance General, who rendered valuable assistance on matters involving a knowledge of the country and administration, and to the endeavour to establish an inter-allied co-ordination and unity of control in respect to contagious and infectious diseases.

On December 6th, 1917, one veterinary hospital (No. 1), less one double sub-division (tented), and No. 6 Base Veterinary Stores were established at Genoa, the detached sub-division being at Pavia. The second veterinary hospital (No. 22) was then on its way from France, but no definite location had yet been determined for it. Certain places offered good railway advantages, and further reconnaissances were made at Pizzighettone, Cremona, Mantova, Legnago. Cremona was ultimately chosen because, in addition to accommodation available, it was located in an agricultural and cattle-breeding district, and the Commando Supremo acquiesced in the cattle market being allotted as the veterinary hospital and the brickworks of the Ceramica-Ferrara as an additional adjunct; together with the requisitioning of local accommodation for the personnel. This brought the reception veterinary hospital on to the main line allotted to British supply trains and reduced the distance to the front from 175 to 137 miles.

No. 22 Veterinary Hospital (Major F. T. G. Hobday commanding), was allotted to Cremona, the intention being to withdraw the detachment of No. 1 Veterinary Hospital at Pavia when the former was ready to receive this detachment (one tented sub-division) at Cremona, and hold it ready to throw forward at any time, say to Legnago. This was, however, never required as the rail service was consistently most satisfactory. No. 1 Veterinary Hospital (less one subdivision at Pavia and later at Cremona) was moved from Genoa to Voghera, 62 miles from No. 22 Veterinary Hospital and 199 miles from the front. A remount depot was established later at Cremona and Voghera.

No. 1 Veterinary Hospital, under the command of Major S. F. G. Pallin, arrived in Italy from France on November 20th, 1917. The hospital was complete and fitted out to accommodate 2,000 sick animals. It was originally intended to detrain in the vicinity of Piacenza, but owing to the uncertainty of the military situation the two troop trains containing it were eventually unloaded, one at Savona and the other at Genoa. A visit from the acting D.D.V.S. (Major H. S. Mosley) resulted in the four sub-divisions of the hospital at Savona joining the remainder at Genoa, where the available tents were quickly erected on the Lido and ready for the reception of sick animals.

As No. 1 was the only veterinary hospital in Italy at this time, one sub-division, under the command of Captain W. J. E. Mackenzie, was at once sent to Pavia in order to provide for sick animals being evacuated by way of Milan.

The two months during which No. 1 Veterinary Hospital was at Genoa were mainly remarkable for the kindly reception and the material assistance given by the residents and garrison of that city. The Villa Amore was at once placed at the disposal of the hospital by the owner for use as officers' quarters and mess. Colonel Edouardo Goltara, of the Garrison Artillery, handed over half his barracks for the accommodation of our 450 men, together with stabling for

our transport animals. The mere mention to the Italian G.O.C. troops at Genoa of the fact that we were short of fuel and bedding for sick animals resulted in an abundant supply of both these commodities, and the personnel of this unit will retain very pleasant recollections of their treatment at Genoa.

As Genoa was at sea level, actually on the sea beach, and unhealthy for horses accustomed to a more bracing climate, not sufficiently advanced, and awkwardly placed for railway communication, it was decided to move the hospital to higher ground. Accordingly, during January, 1918, this hospital moved up to Voghera, where by the courtesy of the Italian authorities it occupied half of the cavalry barracks, and remained there until the end of the war.

The stabling available was augmented by the addition of the stable verandahs and some outside standings near the walls on the north aspect, which were made habitable in hot weather by the fitting of grass mats overhead. This brought the accommodation up to 960. The horse tents for four sub-divisions were erected in a drill field near by, making a total accommodation of 1,260, including dressing shed, forge, also the exercising track, and in the centre liberty paddocks and water troughs.

A small isolation line was opened about a mile away from the main buildings—a most important annexe, as one of the conditions of occupation was that no contagious infectious cases were to be dealt with in the cavalry barracks.

Shortly after the arrival at Voghera the command of the hospital passed to Major T. Bone on the appointment of Major S. F. G. Pallin to be A.D.V.S., lines of communication. No. 1 Veterinary Hospital during this stage of the operations was used chiefly for the treatment of surgical cases, lameness and debility, excellent grazing being obtained nearby for the latter. On the demobilization of the British force, as there was no remount depot at Voghera, this hospital was used as an animal-collecting camp in addition to its normal duties. One sub-division was kept as the veterinary hospital for the army of occupation, British force in Italy, until May, 1919.

During December, 1917, No. 22 Veterinary Hospital arrived in Italy from France, and in accordance with arrangements already made was established at Cremona, where it remained until demobilized on March 31st, 1919.

This hospital was established for 1,250 patients, but was subsequently reduced to 1,000 cases.

Before leaving France, this hospital (as also No. 1 Veterinary Hospital) had been provided with one or more tented double sub-divisions, which allows the quick erection of a complete hospital provided that a certain amount of covered accommodation is found *in situ*. In this case the cattle stables on three sides of the market place were readily adaptable after a few internal modifications had been made.

When a considerable advance takes place the tented sub-divisions of a veterinary hospital can be rapidly taken forward to a devastated area and erected, thus affording to a proportion of the patients immediate shelter from the elements irrespective of buildings.

Experience in Italy as well as in France fully demonstrated the usefulness of horse tents, and pointed to the advisability of including this equipment in mobilization stores.

No. 22 Veterinary Hospital was used for reception, with a ward for contagious and infectious cases.

The buildings comprised long cattle byres, arranged longitudinally and supported on two flanks by shorter byres arranged transversely. The central corn exchange was readily adaptable to offices, stores, mess, canteen, etc. In the open space around it some horse tents were put up on the cattle lines and were provided with a hardened floor, also an exercise track. One of the small byres was adapted for a hot water spray and a disinfecting apparatus for mange cases.

The railway wagons which brought in the sick horses were cleaned and disinfected, and labelled "disinfettato."

An annexe, located in a tile and porcelain works (Ceramic Ferrara), with the addition of some horse-tents could accommodate 526 cases.

Arrangements for mange cases on a basis of 250 cases were made, and tents were set apart for their accommodation.

The construction of a horse-dip was considered, but was not undertaken in view of the uncertainty of the period of sojourn of the British forces in Italy and of the limitations of the lines of communication, the considerable time that would be necessary for its construction, the large quantities of R.E. materials required, and the expense of erection. A modified apparatus was devised by the D.D.V.S. in the form of a stable fitted up with douching sprays to deal with 160 horses daily. It was in use from March, 1918, until demobilization.

Two tanks, one for water and another for calcium sulphide solution, were heated by steam from a circulating boiler outside the wall of the stable, and the fluid was distributed along an overhead pipe to taps above each stall.

The stalls were made very narrow in order to prevent the animal who stood on the low walls between each stall from moving away from the dresser.

The system usually adopted was to fill all the stalls with patients and first rub in with a brush paraffin emulsion, then lather with hot water, use squeegee, and then skin massage, and finally dress with calcium sulphide solution if a psoroptic case. For sarcoptic or mixed infection an oily basis dressing was used. The N.C.O. in charge controlled the taps for distributing either hot water or calcium sulphide solution; rubber tube attachments were fixed to the taps.

In both hospitals there were an operating theatre, dressing sheds, a horse-dip, and machinery for crushing corn and chaffing

hay. In No. 22 Veterinary Hospital a hot water system was laid on where 20 animals could be washed at the same time.

From January 1st, 1918, to November 14th, 1918, 9,270 animals were admitted into the hospital. Of this number :—

70·47 per cent. were discharged to remounts.

1·13 „ died or were destroyed in hospital.

12·60 „ were cast and sold either to the farmer or butcher for destruction.

15·80 „ remained under treatment.

From November 21st, 1918, to May 8th, 1919, 1,453 animals were brought forward and 5,088 fresh cases were admitted : totalling 6,541. Of this number :—

45·58 per cent. were discharged to remounts.

·52 „ died or were destroyed.

53·90 „ were cast and sold to the butcher.

In the aggregate during the whole period the hospitals dealt with 14,358 animals. This figure excludes 4,785 animals which were admitted from the forward area to be tested with mallein before being transferred to the remount service for sale.

On demobilization, every animal in the force was examined for soundness, and any animal suffering from debility, defective vision due to recurrent ophthalmia, blindness, lameness, injuries (particularly harness or saddle injuries), malformation affecting gait, condition and harness injuries, old age, and any animals requiring prolonged treatment in hospital were cast and sold to the butcher. With a few exceptions these animals were sent from the forward area to the veterinary hospitals.

The output from veterinary hospitals, on percentage of field strength, rose over 1 per cent. per week in April, 1918, the highest being 1·61 per cent. for the week ending June 20th, 1918.

Mange.

It was too much to hope that the force would long be free from mange, and within two months after arrival in Italy a serious outbreak had to be dealt with, principally among units that had not clipped their animals before leaving France.* In two artillery brigades its existence was not detected until the animals were clipped out.

Long coats mask the disease and make diagnosis difficult. In these circumstances the disease becomes so widespread that in course of time, unless elaborate precautionary measures, such as dipping and the disinfection of equipment and clothing, are taken, all the animals of the unit develop it.

If the percentage of cases was high and the military situation permitted it, all the animals of the unit were evacuated with clothing, etc., to veterinary hospital.

* A General Routine Order, Italy, was published in August, 1918, ordering all horses to be clipped by October 15th on the mountains, and up to October 31st in the plains, and re-clipped trace high during the following January.

On March 14th, 1918, 1,405 animals were under treatment—a high percentage. The outbreak was localized among a few units, brought under control and gradually stamped out; and fresh cases ceased on October 3rd, whilst at the time of the armistice only 43 cases were receiving hospital treatment.

An examination of the unclipped animals was made for early lesions in the occipital region, base of ears, supraorbital fossa, under the throat lash, and intermaxillary space. It was suspected that a reinfection of the body was taking place from parasites which had taken refuge on the head, where they had escaped death during previous treatment, especially by the dip method.

A General Routine Order authorised the clipping of any animal which in the opinion of the veterinary officer was in a mangy or verminous condition.

The mange treatment given in veterinary units of the 3rd Italian Army comprised dressing with a 3% solution of potash sulphurate made with hot water—to be followed in a few days (varying with the type of case) by pomata helmerick (a preparation of potass. carb., sulphur and vaselin).

Specific or Periodic Ophthalmia

Special observations were made on the effect that the change of climate and environment might have on animals suffering from recurrent ophthalmia which had been contracted in France. The general sanitary conditions of horse-lines had been improved by the absence of the foul mud, by the selection of cleaner sites, and by smaller accumulations of manure. The subject was discussed with the army veterinary services of the allied forces. The D.V.S., 6th Italian Army, held the view that ophthalmia occurred more frequently among horses when living in the open than when stabled. It was common in the plains of northern Italy, particularly in the province of Lombardy, and horses of lymphatic type were more susceptible than thoroughbreds. The low-lying irrigated pastures of north Italy suggested the possibility that the disease might be carried by flies. The glare of the sun did not have any noticeable effect on the incidence. The admissions for this disease were 853 before the armistice.

Fresh cases actually occurred while the force was in Italy, and it was stated that the disease was indigenous in the plains of northern Italy, especially in the province of Lombardy.

When animals were selected for sale on demobilization, any horse which showed defective vision due to ophthalmia was cast and sold to the butcher. This course was followed in order to protect both the public and the animal. A blind horse can work under conditions to which it is well accustomed, but when put on strange work in a strange locality and with strange people it is at a great disadvantage.

Epizootic Lymphangitis.

Anxiety was felt that our horses would be exposed to even greater risks of infection with epizootic lymphangitis in Italy, where the

disease was known to be enzootic, but although billets vacated by allied troops were occupied only twelve cases occurred. These were confined to one unit, which had brought an infected case with it from France. This small number of cases is attributable to the care in dressing wounds by the A.V.C. personnel, especially those with field units. One animal among those captured from the Austrians in November, 1918, was suffering from this disease.

All affected animals were immediately destroyed on diagnosis, and all in-contact wound cases were marked E.C. and during the fly season were kept in fly-proof shelters or registered for periodical inspection.

Lieut.-Colonel H. S. Mosley wrote as follows in 1918 :—

So far as one knows, it has not yet been definitely proved whether the causal organism is an animal or vegetable parasite. If it is the latter, and belongs to the order of saccharomyces, then the vegetable growth would largely depend on climatic influences. One would suggest, for instance, that the growth would be more favourable in a warm, humid country than in a dry heat. Teppaz observed that climatic influence plays an important part in the development of the cryptogam flora, being more favourable in a hot low-lying marshy region. This year the season in northern Italy has been exceptionally wet, and the humidity of the atmosphere has been abnormal; as an illustration, one might take the growth of fungus on vines, which is very extensive.

Sanitation.

The climatic conditions which influenced the health and efficiency of the animals were principally the variations of temperature between shade and sun exposures, which were more noticeable during the winter months and at high altitudes, and as a rule not dependent on changes of direction of wind, as for instance in England.

In northern Italy, where extensive irrigation and lakes abound, the air is humid and, in the winter, foggy and penetratingly cold, particularly during the morning. A sudden fall of temperature is observable during the ascent from Genoa to Aquata and up the mountains to the Asiago plateau.

Owing to the dryness of the climate, except during the winter season, the horse-lines could be kept in better order than in France. The general health of the horses was good, and wound infections of the limbs, as well as specific ophthalmia, were very much reduced. The latter may be accepted as slight evidence showing that insanitary horse-lines were a favourable environment for the life-cycle of micro-organisms.

The water supplies were not always above suspicion, and watering from roadside and village troughs had to be prohibited as all and sundry used them. Watering was usually from pipe-water laid on to troughs in our lines, from fast running rivers, by water buckets from taps, hydrants and irrigation channels, wells, etc. On the plateau water for animals was scarce.

Disinfection was, as in France, an important factor of control, and attention was chiefly directed to the disinfection of :—

(1) Railway wagons. Every effort was made to keep these clean.

- (2) Horse rugs, saddle-blankets, harness and horse gear generally.
- (3) Stables evacuated by animals of allied forces owing to changes of front, reliefs, variations in rest areas. Special measures were taken when cases of contagious and infectious disease were known to have existed.
- (4) Clothing, to prevent foot-and-mouth disease being taken by men on leave proceeding to the United Kingdom.
- (5) Manure, especially fresh, by chemical processes or by burning in incinerators. This was the principal precaution taken to combat the fly pest in addition to the destruction of the usual breeding ground. Use was made of a spray of arsenite of soda solution and Cooper's cattle-dip solution. The influence of manure in spreading intestinal diseases in man renders its disposal of great importance. The general cleanliness of floors as far as can be obtained under active service conditions is also essential.

The Clipping of Horses and Mules.

A question of great hygienic interest was the advantage, if any, to be gained from the clipping of animals. Although the controversy on this subject had already arisen in France, a short general review will enable the situation to be more thoroughly understood. During the first winter the clipping of horses was left to the discretion of the officers commanding units, in accordance with the practice prevailing during peace. During the winter of 1915-16 mange began to give trouble, and general headquarters ordered compulsory clipping for all units. During the winter of 1916-17 the clipping was left to the discretion of the general officers commanding armies, who decided that it should be carried out once, and that mules should not be clipped except for veterinary reasons.

In the area of the Second Army, where stabling and temporary shelters had been erected, and most of the animals were accommodated, even allowing for moves of divisions in and out of the line, the animals did not suffer very much in condition, whilst the beneficial results of clipping in the control of mange were very marked. On the fronts of other armies conditions differed. For instance, during the offensive on the Somme, where the surface was practically a quagmire, and there was no stabling or shelter of any sort for horses in the forward areas, clipping had to be abandoned because it seriously affected the health of the animals. During the winter of 1917-18 the horses in Italy were clipped, as well as a great proportion of the mules. The Italian army also clipped its horses and mules twice, if possible, during the winter, and stated that although the animals may be exposed to inclement conditions the value of clipping from the point of view of the controlling of mange entirely justified its being carried out. This is a topic of animal management which caused more controversy than any other during the war.

The commanding officer, who is responsible for the condition of the animals of his unit, is embarrassed by an order to carry out a procedure such as clipping, of the value of which he is unconvinced. At the same time the receipt of such orders relieves him of further responsibility in respect to the maintenance and condition of his animals, and he cannot be blamed for the results. On the other hand, the veterinary officer, in order to keep the incidence of mange under control, is bound to clip affected animals in order to treat them and also to clip those which have been in contact with the disease in order to inspect them.

If clipping is decided upon it should be carried out early in the winter because otherwise the coat becomes matted with mud and excretions from the skin to such an extent that grooming under conditions of active service is an impossible task, and it is most difficult to clip the animals later in the year.

With early clipping the skin can be kept reasonably clean by grooming throughout the winter, and it is possible to clip again in the spring at the time of the casting of the coat when the operation is of great advantage to the animal.

Mules deserve special treatment because (1) they very rarely contract mange; (2) their coats are usually much finer and in consequence can be more easily groomed although unclipped, and (3) a great proportion of them very strongly resent being clipped at all. There is no doubt, however, that, if stabling or rugs can be provided, mules keep in much better condition when clipped.

Veterinary Bacteriological Laboratory.

Captain R. H. Knowles, the veterinary bacteriologist in Italy, opened the laboratory at Cremona in April, 1918.

The principal work included :—

- (1) Investigation on ulcerative lymphangitis, including (a) treatment by vaccine; (b) pyovaccine; (c) serum.
- (2) Research work on recurrent ophthalmia. Five methods of experimental treatment were employed, none of which gave satisfactory results. Research on this disease was still in hand at the time of closing the laboratory.
- (3) Preparation of polyvalent antipyogenic serum for the treatment of wounds.
- (4) Diagnosis of material sent from the forward area and the veterinary hospitals, chiefly dealing with epizootic lymphangitis and ulcerative lymphangitis, which proved of great value in controlling contagious diseases.

No. 6 Base Depot of Veterinary Stores.

Established at Aquata, November, 1917. Moved to Cremona, August 7th, 1918.

During the whole period 874 parcels of stores and instruments were issued.

Demobilization.

A review of all animals was made on similar lines to those followed in France, and each animal was graded and marked according to the category allotted by the board of officers. On this basis the gradual disposal of animals not intended to be retained in the army commenced, i.e., by sale locally to butchers for use as meat for human consumption. In this disposal the units A.V.C. gave great assistance in addition to their duties normally carried out for sick animals. The majority of the animals sold in the forward area were sent from units to the mobile veterinary sections to be tested with mallein before being transferred to remount animal collecting camps.

The veterinary evacuating station was moved to Montecchio Maggiore on January 1st, 1919, and formed the nucleus of the forward animal disposal camp for the force located in the Lonigo and Tressino areas. This unit dealt with 2,324 animals between January 7th and March 24th, 1919, of which only four died.

Horse equipment and gear, before being sold or returned to the United Kingdom, were subjected to a thorough overhaul and were disinfected under veterinary supervision. No used nose-bags or grooming kits were taken to the United Kingdom. Disinfection was conducted either at the unit in the case of articles taken to the United Kingdom, or at the base in the case of articles surplus to requirements.

For saddlery a convenient and effective disinfectant was used, viz., a paste of equal parts of paraffin and hard soap, which was well smeared on the leather and washed off with warm water, 1 lb. of paste being sufficient for 152 head collars.

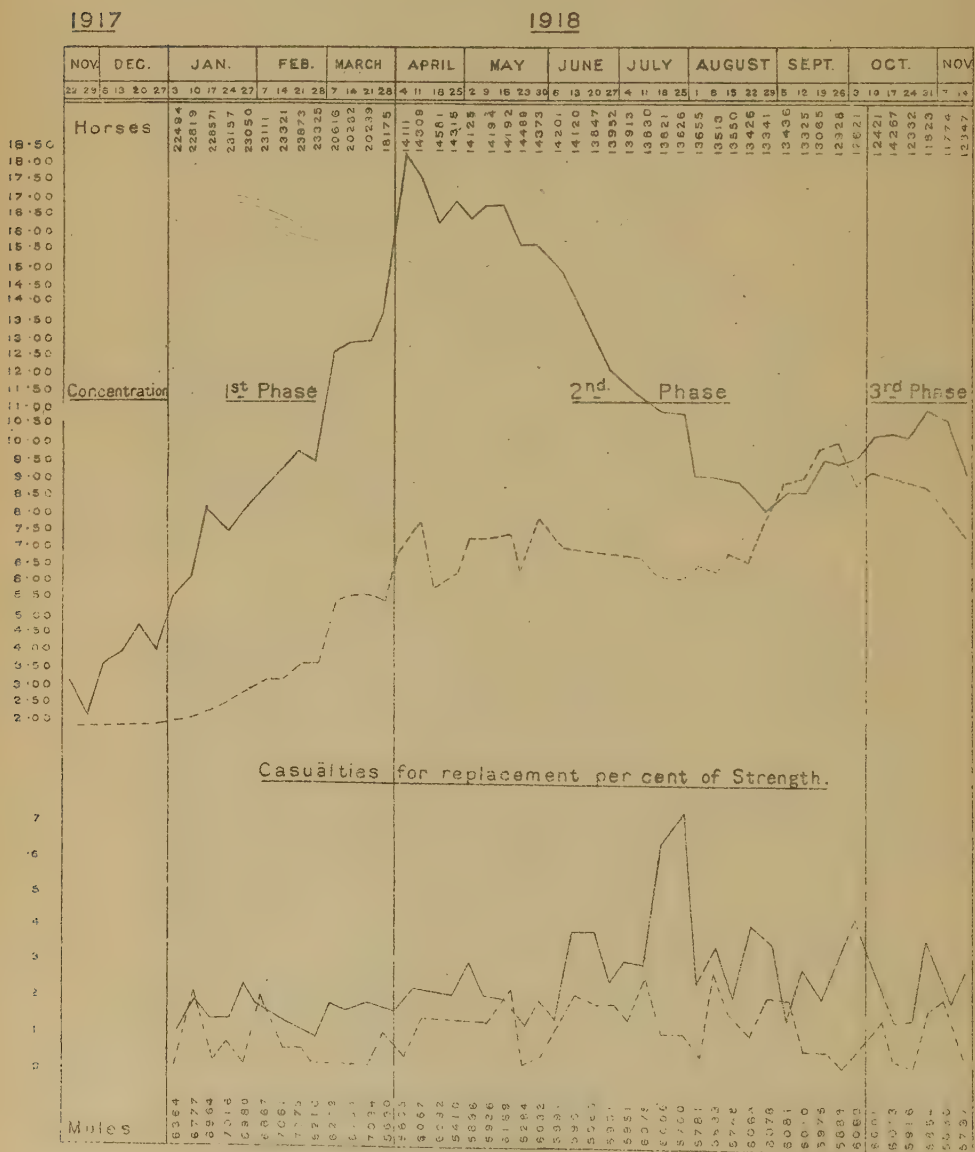
Local Sale of Cast Animals on Demobilization.

Arrangements were made for the local disposal of animals cast from the army as unfit for further army service as well as for those cast as surplus to requirements yet fit for civilian work, but before they passed into other hands enquiries were made into the conditions of protective guarantees in order to ensure as far as possible their being well treated. The heads of accredited agricultural societies were interviewed and suitable conditions were drawn up. Great assistance was received from Provincial Veterinario Dott Cav. Provido Sacco, of Cremona, and in recognition of the good services rendered by this officer the Order of the British Empire was afterwards conferred upon him.

The conditions drawn up included the following provisions, viz.:—

- (1) That an officer of the British Army Veterinary Service or other British representative should be permitted to inspect the animals from time to time after local sale.
- (2) That the animals should not be re-consigned to another party or disposed of without the previous consent of the agricultural society concerned, and confirmation by the British military authorities.
- (3) That the agricultural societies would control and place out animals, and guarantee compliance with the conditions.

Chart (Italian Front) Average weekly Sick rates per cent on Animal Strength of the force including those sick in Veterinary Hospitals.



NOTE:- Horses shown thus _____
Mules " " -----

Statistics.

The weekly incidence of disease, calculated on the basis of animal strength during the period from the arrival of the British forces in Italy until the armistice, is shown in the accompanying chart, which also shows the wastage per cent. for replacement.

The veterinary statistics for horses and mules were kept distinct throughout the campaign, and it should be noted that the figures in the chart have been calculated separately for horses and mules. For instance, the weekly average number of horses sick in veterinary hospitals was 11·64 per cent. of the total establishment of *horses*, and the weekly average of mules in hospital was 6·6 per cent. of the total establishment of *mules*. The annual rate of wastage among horses was 13·52 per cent., of which 5·2 per cent. died or were destroyed and 8·32 per cent. were cast and sold. The annual rate of wastage among mules was 6·76 per cent., of which 4·16 per cent. died or were destroyed and 2·6 per cent. were cast and sold.

It must be recognised, however, that owing to the profitable arrangements that were made in Italy for the disposal of animals for food, the numbers of those cast and sold included a considerable proportion of animals that under less favourable conditions would necessarily have been included in the figures relating to those that died or were destroyed.

Allied Veterinary Directorates.

As the consequence of the general liaison established between the army veterinary services of the Allies, a good insight into their respective organizations was obtained by those concerned. The interchange of views was moreover of mutual advantage in addition to establishing an agreeable and cordial relationship. Frequent meetings were, however, prevented by the great distances and transport difficulties.

* TABLE A.

*Extract from General Routine Orders issued by Commander-in-Chief
the British Forces in Italy.*

General Headquarters.
17-1-18.

189.—*Disposal of Sick Horses and Mules unable to march with units.*

All sick horses and mules which are unable to march with units will be sent to a mobile veterinary section.

If this is not possible, they will be handed over in the following order of preference :—

- (a) To the nearest Italian veterinary infirmary, the position of which will be ascertained from the Commando di Tappa or local authorities.
- (b) To the Commando di Tappa.
- (c) To the local maire (sindaco) or his representative.
- (d) To an inhabitant.

A report will be made to the nearest police station when animals are left behind as in (c) or (d).

A receipt will invariably be obtained for the number of animals handed over.

* See page 362.

No statement as to the amount payable for the keep of such animals will be made to the person who receives them.

Payment of all claims for keep will be arranged by the D.D.V.S., G.H.Q., and the officer i/c requisition services.

An entrance note, *pro forma* below (horse recovery form No. 1, Italy) will be prepared in triplicate.

The original, which will not on any account contain the name of the unit or formation concerned, will be handed over with the animal.

The second copy, which will contain the name of the unit or formation, will be forwarded without delay to the administrative veterinary officer of the formation, who will report accordingly to the D.D.V.S., G.H.Q.

The third copy will be retained by the unit.

Os.C. units and formations will be held responsible that the above procedure is carried out, and any cases of neglect or delay in reporting animals left behind will be investigated by the formation concerned and a report rendered to G.H.Q.

Horse Recovery Form No. 1 (Italy).

Document to be given to the person with whom an animal of the British Army is left for care.

To be completed and signed by the person leaving such.

Mr.....Address

I am leaving....sick^{horse}_{mule} belonging to the
the British Army, to take care of and feed until removed by the British Military Authorities.

The horse is at the present time in ^{good} fair condition.
_{poor}

State how many animals are left.

Date.....

.....
Signature of person leaving the animal.

Notice.

1. The certificate shown above signifies that one (or more) animals belonging to the British Army is left in your charge. You should water and feed it and look after it well.

2. It is strictly prohibited to work the animal.

3. If the animal dies you should immediately report to the sindaco (maire), and keep the four feet of the animal as proof to be shown to the officer coming to collect the animal.

4. The amount which you will receive will depend on what you have given the animal to eat, and on its condition.

5. This note will be produced by you in support of your claim.

CHAPTER XVI.

THE VETERINARY SERVICES IN SOUTH AFRICA AND
SOUTH-WEST AFRICA.

AT the outbreak of war, the veterinary personnel of the Union Defence Force of South Africa consisted of one officer (who unfortunately was then on the sick list), one N.C.O., and one civilian storeman.

The first step taken by the Union Defence authorities in the formation of an Army Veterinary Service was the engagement (in an advisory capacity) of the senior veterinary officer on the Reserve of Officers of the Union.

This officer was instructed to engage seven other veterinary practitioners for military service, and was given authority to make the necessary purchases to complete the requirements of veterinary stores. The services of seven veterinary practitioners were speedily secured ; one was sent to Tempe for duty in relief of the permanent veterinary officer who was on the sick list ; the remaining six officers were sent to Cape Town to join the expeditionary forces.

The total animal establishment on mobilization comprised 8,000 horses and mules.

The shortage of veterinary instruments and drugs was temporarily overcome by drawing on the Johannesburg municipality, who were in possession of large reserves. At the same time, cablegrams were sent to England for additional supplies of instruments and drugs, including 50,000 doses of mallein. Altogether, 350,000 doses of mallein were ordered from England over and above the total output of the Government Veterinary Bacteriological Institute, near Pretoria.

On September 1st, the officer mentioned above as having been engaged in an advisory capacity was appointed Director of Veterinary Services, Union Defence Forces. By this time, remounts were being bought throughout the country, and remount depots had been established and were springing up at a large number of centres. Regiments and commandoes were being speedily mobilized. Demands for veterinary services were pouring in from all quarters.

Veterinary regulations had been considered and drafted, but had not been published. The Secretary for Defence, on his return from England, was interviewed on September 22nd, 1914, and the veterinary regulations were discussed, approved and duly gazetted under Government Notice No. 1714 of 1914, dated October 8th. The D.V.S. was instructed to form and organize a veterinary service.

A base veterinary depot was established at Booysens, Johannesburg ; the enlistment of subordinate personnel for the South African Veterinary Corps was actively undertaken ; training was pushed on at full speed day and night ; and additional veterinary officers were appointed to the various units as they were formed. A base

veterinary store was opened at the South Arm Docks, Cape Town. Quotations were called for and orders placed locally for the manufacture of veterinary chests.

The rebellion broke out, numerous commandoes and new mounted units were created, which further increased the demand for more veterinary services. Eight base veterinary hospitals, fifteen mobile veterinary sections, and veterinary details for all mounted units, remount and transport depots, shipping details and buying boards, were speedily equipped, trained, turned out in seven weeks' time, and posted to their respective units from the base veterinary depot at Booyens, Johannesburg.

All appointments, enlistments, records, etc., were made and kept at the South African Veterinary Corps headquarters, Johannesburg, and the demobilization at the end of the campaign was also handled by this office without a hitch.

All officers and subordinate personnel of the South African Veterinary Corps consisted of volunteers. The establishment rapidly increased to 47 veterinary officers, 450 N.C.Os. and men, and 650 natives. The whole veterinary organization was hastily evolved from nothing, and was entirely an emergency organization.

The number of animals increased by leaps and bounds from the original number of 8,000 until veterinary services were provided for a total of 160,000 animals.

The following table shows the number of animals treated by the South African Veterinary Corps units from the outbreak of hostilities in August, 1914, to January 31st, 1916 :—

	Admitted.	Discharged	Dead.	Death rate for 17 months.	Death rate per annum.
				per cent.	per cent.
Horses	60,023	50,341	4,611	7·6	5·3
Mules	12,168	8,806	983	8·07	5·66
Donkeys ..	2,968	1,830	506	17·04	12·0
Totals ..	75,159	60,977	6,100	8·12	5·72

The above death-rate of animals under treatment reveals excellent results, and will compare favourably with the results of any other African campaign.

Total Losses.

In order to arrive at the total losses to the above mortality list must be added deaths from starvation, exhaustion, horse-sickness

and anthrax; also destructions for extreme debility, reactors to the mallein test and glanders, and deaths from all other causes which took place on the line of march, and in all camps outside of the veterinary hospitals, viz. :—

Horses, 8,715; mules, 2,136; donkeys, 2,452; oxen, 2,559; as follows :—

Description.	Deaths and destructions in veterinary hospitals.	Deaths and destructions outside of veterinary hospitals.	Total deaths and destructions from all causes.
Horses	4,611	8,715	13,326
Mules	983	2,136	3,119
Donkeys	506	2,452	2,958
Oxen	<i>nil</i>	2,559	2,559
Totals	6,100	15,862	21,962

This gives a grand total of deaths and destructions of animals from all causes of 21,962, which equals 13·72 per cent. for 17 months, or an annual death rate of 9·09 per cent.

It will therefore be seen that the Union Defence Forces came out of the German South-West African campaign and rebellion with very small animal losses as compared with other nations in other campaigns.

In accordance with instructions, arrangements were made to supervise the canning of all meats, intended for the Union Defence Forces, prepared by the various firms in Johannesburg. All animals and meat for the fulfilment of these contracts were duly inspected.

The D.V.S. was required to visit, inspect and report upon the premises and the methods of bacon-curing at Nels Rust Factory, Natal. Reports were submitted on large quantities of bacon turned out by this factory and elsewhere.

The chief arrangements for veterinary accommodation made during the short period of hostilities which preceded the rebellion were :—

No. 1 Veterinary Hospital was located at Prieska.

„ 3 „ „ „ De Aar.

„ 4 „ „ „ Luderitzbucht.

„ 5 „ „ „ Capetown.

„ 7 „ „ „ Luderitzbucht.

The base depot of veterinary stores was formed at Capetown.

The rebellion necessitated a redistribution of mobile veterinary sections and the formations of new ones, as well as the establishment of No. 8 Veterinary Hospital at Pretoria.

On the conclusion of the rebellion a further redistribution of mobile veterinary sections was made, and moves of veterinary hospitals took place as follows :—

No. 3 Veterinary Hospital from De Aar to Walvis Bay.
 „ 8 „ „ „ Pretoria to Swakopmund.

Eastern Force.

The Eastern force had to trek through some 400 miles of desert, with its base at Kimberley. Part of the country between Kimberley and Kuruman was known to be a notoriously anthrax-infected area ; every precautionary measure was adopted to prevent this disease retarding movements ; and, although it made its appearance, it was effectively prevented from getting a hold. Only a limited number of casualties occurred amongst the transport oxen, and these did not hamper in any way the movements of the force. There were no anthrax cases reported amongst the horses and mules. The A.D.V.S. was instructed to station an advance veterinary hospital at Kuruman, and another at Bushmansputs, and to evacuate all sick animals back to the base at Kimberley. As the column moved forward, Mobile Veterinary Section “ E ” was detailed to bring up the rear and collect all stray and worn-out animals left behind. This organization operated effectively, and the general officer commanding reported as follows :—

“ Veterinary. . . This service was efficiently carried out by the S.A. Veterinary Corps. There was some horse-sickness but very little other sickness. Animals became somewhat run down from hard work and shortage of water and food. There were comparatively very few cases of sore backs. The oxen had a few cases of anthrax. Veterinary detachments were detailed to each unit.”

On reaching German territory instructions were issued for rest camps and veterinary hospitals to be formed on farms where grazing could be found and water was available. This force afterwards became part of the Southern Force.

Central Force.

The Central Force had its base veterinary hospital at Luderitz-bucht, and, as the force advanced, veterinary hospitals were posted along the lines of communication.

The scarcity of water was one of the great problems confronting this force, and animals were restricted to watering once daily. The water supply consisted of condensed sea water and water carried from Capetown by the various transport ships. This force had to trek through sixty miles of desert from the seaboard, and was faced at Aus by an entrenched enemy. Glanders made its appearance in the early stages, but was quickly suppressed and stamped out by a rigid enforcement of the mallein test. The number of animals destroyed for glanders was forty-four. A large stock of mallein ordered from England on the outbreak of hostilities having come

to hand, the eradication of the disease was quickly effected with a minimum loss and inconvenience to the troops. Whale Island was used as an isolation station while the 2nd I.L.H. underwent the test.

The Central Force ultimately became merged into the Southern Force when the general advance took place.

The A.D.V.S., Southern Force, assumed the duties of A.D.V.S. of the combined forces. Arrangements were made to embark all sick animals at Luderitzbucht and forward them to No. 5 Veterinary Hospital at Parow, near Capetown.

Southern Force.

On September 13th, 1914, Major J. G. Bush was instructed to proceed from Tempe to Upington for duty as A.D.V.S. to the force, mobilizing at Upington under Lieut.-Colonel Maritz. This force was fairly well mounted, and the A.D.V.S. reported that the health of the animals was fairly good, strangles present, a number of injuries, ophthalmic and sand colic cases required constant veterinary attention.

On October 2nd, 1914, Maritz moved out of Upington to Van Roois Vlei, and an inspection made immediately before his departure showed the animals belonging to his force to be in fair condition and hard.

For some time prior to this it had been obvious that the situation in the camp was very far from satisfactory. There were rumours of rebellion amongst the members of this force, and the situation became distinctly strained. The loyal section, consisting of the veterinary officer, transport officer, and Maxim gun section, were camped a short distance from Maritz's main camp with a road running between. After a consultation between the A.D.V.S., Lieutenants Maclaren and Frere, it was decided, in order to protect themselves against sudden surprise and seizure, that sentries should be posted nightly in concealed positions and that the Maxim guns should be trained on the rebel camp.

As senior officer, the A.D.V.S. was left in command of the camp at Upington, which consisted of various details from Maritz's force, transport and remounts, and a few days later he received a helio message from Maritz to send on all horses which could possibly carry a saddle to Van Roois Vlei, including even those under treatment. This order he did not obey, and later on the general officer commanding approved of his action.

The critical situation necessitated his being used for the next few weeks entirely in a combatant capacity, and during this period he was in command of defensive positions to the west of the town.

The first regiments of I.L.H., Enslin's Horse, and Natal Light Horse, together with the 2nd Permanent Battery, arrived in Upington and the situation became easier. The above regiments marched by road to Upington, and their horses arrived in fair condition, with the exception of those belonging to the Natal Light Horse, which

showed an unduly large proportion of sore backs. The donkey transport attached to the regiment also arrived with the animals in wretched condition, having lost a large number en route. Many of the donkeys examined were much too young for work and should never have been purchased.

On October 25th, the A.D.V.S. proceeded to Kakamas, Maritz having been driven out. The horses had stood the work up to this point fairly well, but shortage of supplies necessitated wheat being used as a grain ration at Kakamas, resulting in a large number of cases of laminitis and colic.

It was his intention to establish a base veterinary hospital at Kakamas, but the rebellion in the Orange Free State and Transvaal brought about a complete change in the situation.

On November 17th, 1914, No. 1 Veterinary Hospital arrived in Upington and took over the veterinary sick lines at that place. Shortly afterwards a mobile veterinary section was despatched for duty with the brigade under Colonel Bouwer, which was operating against the rebel Kemp, who was attempting to form a junction with the rebel Maritz on the German border. This veterinary section did excellent service, and during the running engagement, which resulted in the rebels getting through at Rooidam, was able to save a considerable number of broken-down and exhausted animals abandoned on the line of march both by Kemp and the loyalists.

"A" Mobile Veterinary Section arrived in Upington on November 23rd, 1914, and the officer commanding was placed in charge of the base veterinary hospital, which was established there. On the completion of the operations against Kemp, the troops returned to Upington.

Owing to the shortness of rations and the strain which the horses had been put to, their condition was very poor. After a veterinary inspection of the various regiments, it was found that at least a ten days' rest was required before any operations could be undertaken.

Colonel Van Deventer now took over command of the Southern Force, and for the next two months the rebel commandoes were constantly in the vicinity of Upington which made it impossible to send the animals any distance from the town for grazing purposes. The Orange River also rose to an unusual extent, and, as there was no bridge, the transport of sufficient forage from rail-head to the south bank became a serious problem. Owing to the above-mentioned reasons, the condition of the animals remained stationary, and in many cases became worse.

There was a scarcity of remounts, and those sent down fell off in condition after arrival. A large number of debilitated animals which, owing to the shortage of forage, it had been found necessary to send out to neighbouring grazing farms, went from bad to worse, and most of the survivors did not again become fit for service during the campaign.

It is not suggested that anyone was to blame for this state of affairs, which was due to the exigencies of the military situation and to the swollen state of the river. Had the railway bridge been completed during the dry season, and not postponed till rail-head reached the south bank, it might have been avoided.

During January, 1915, owing to the proximity of enemy forces to the town, it was found necessary to remove part of the sick lines to a more sheltered spot in order to be out of shell fire.

On January 24th, 1915, the rebels under Kemp and Maritz attacked Upington, and a few days later a German force attempted to surprise Kakamas. Both attacks were repulsed, and this led to the surrender of the rebel forces early in February.

After this the position with regard to the animal rations became considerably easier, and it was possible for full rations again to be issued.

The 4th Mounted Brigade, with Mobile Veterinary Section "F," arrived during the first week in March, and preparations were made for a general advance.

The veterinary arrangements were as follows :—

Headquarters	..	..	..	A.D.V.S.
4th Mounted Brigade	..	..	..	Mobile Veterinary Section.
10th Brigade under General Van Deventer..	..	..	..	Mobile Veterinary Section.
11th Mounted Brigade	..	..	..	Mobile Veterinary Section.
Transport	One officer and veterinary details

Base Veterinary Hospital, Upington	One officer.
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On March 10th, 1915, the A.D.V.S. left Upington for headquarters, Johannesburg. He visited Kimberley and inspected the veterinary hospital, and also acted as the President of a Board of Inquiry into the purchase of certain remounts at that depot. Later he inspected Standerton remount depot. On completing that duty, he returned to Upington with instructions to join General Smut's staff as A.D.V.S. with the combined forces. On arriving at Ukamus, in German territory, he found that orders had been received for the whole of the southern force, with the exception of that part which originally composed the central and eastern forces, to return to Upington, and he therefore went back to that place to make the necessary arrangements after instructing the various veterinary officers to return with their respective brigades.

As glanders was now known to exist amongst animals belonging to the southern forces, arrangements were made for the malleining of all the horses on arrival at Upington. It was at first thought that the mules might be allowed to go forward untested, but, as a case of glanders was reported amongst a consignment arriving at Maitland, an order was given to test all equines. A detailed account of this operation is given on the next page.

On September 4th, 1915, he was ordered to Kimberley, and thence to Capetown in connection with an outbreak of glanders at Maitland transport and remount depot, particulars of which are given later.

On November 24th, 1915, he was instructed to return to Upington, remaining in charge of veterinary duties at that station until the base veterinary hospital was closed down in January, 1916.

Staff.

The A.D.V.S. reported that the officers under his command carried out their duties zealously and well, frequently under very trying conditions.

Scheduled Contagious Diseases.

- | | |
|---------------|-----------------------------|
| (1) Glanders. | (3) Anthrax. |
| (2) Mange. | (4) Epizootic lymphangitis. |

Glanders.

The first case of glanders in the southern force occurred amongst the horses of the 4th Mounted Brigade, which arrived at Upington from Potchefstroom in March, 1915. On March 5th, 1915, it was reported that one of the horses belonging to the 4th Mounted Brigade which had been taken out of the train at De Aar, had been found to be suffering from glanders and was destroyed. The horses belonging to the regiment were at once tested at Upington and seven reactors destroyed. No further cases of glanders were reported until May 3rd, 1915, during the demobilization of the southern force, when a clinical case was reported in a horse which had come from Schuit Drift Transport depot at Kamus, German South-West Africa.

In view of these facts it was decided to test all horses and mules belonging to the forces as they arrived at Upington; from that date animals continued to return from the Protectorate until January 16th, 1916. By the latter date 25,454 animals had been tested, out of which 810 reacted and were destroyed. Post-mortem examinations were made, and in the majority of cases revealed young and active lesions in the very early stages. A very large percentage of officers' horses reacted, due no doubt to the fact that these animals were frequently *stabled* in German South-west Africa. Many captured German horses reacted, and on post-mortem examination proved to be badly infected. Many showed old standing lesions.

Glanders at Maitland.

In September, 1915, it was reported that, owing to the appearance of glanders at Maitland transport and remount camp, it had become necessary to close the depot to all movements. There were at this time some 9,000 animals at Maitland and, after consultation with the various officers, it was decided to test the entire number and move them to clean ground at Vredehoek. Four kraals were set aside at Maitland for animals for malleining purposes, two for injection and

two for malleined animals under observation. These kraals were thoroughly disinfected and lime washed, and disinfection was repeated after the discharge of each batch of animals. Immediately the animals had been passed they were branded on the neck with a numerical brand according to the day they had been malleined. They were then immediately removed to Vredehoek and kraaled according to the neck number. On the expiration of ten days the retest was carried out at Vredehoek and the animals released. The results of this procedure were very satisfactory, and glanders did not again make its appearance at Maitland.

Mange.

With the exception of a few isolated cases, this disease was not noticed in the Southern Force until June, 1915, when a report was received from Capetown that a number of mules amongst a consignment despatched from Upington on June 4th, without any veterinary examination prior to their departure, were found to be badly affected. Later on in the same month 400 horses and mules came forward from the Protectorate which were all affected with the disease, and the number continued to increase throughout July. A dip was therefore erected, and all horses and mules passing through this depot were systematically dipped in arsenite of soda solution before being sent forward to Kimberley. Bad cases were sent to the sick lines and dressed with sulphur dressing. Considering the prevalence of this disease, and the fact that it was kept within bounds, the results were extremely satisfactory. The total number of cases of mange treated at the base veterinary hospital, Upington, was 1,648.

Anthrax.

This disease made its appearance amongst the transport oxen in November, 1914, and cases continued to occur from time to time until May, 1915. All precautions were taken with regard to the disposal of the carcasses by burning and the disinfection of the ground. The outbreak never attained serious dimensions, only twelve cases occurring in all.

Epizootic Lymphangitis.

Only five cases of this disease were noted with the Southern Force. In every case the animal was destroyed, and no treatment attempted.

Other Diseases.

- | | |
|---------------------|-----------------|
| (1) Strangles. | (5) Pneumonia. |
| (2) Horse-sickness. | (6) Sand colic. |
| (3) Ringworm. | (7) Enteritis. |
| (5) Piroplasmosis. | |

Strangles.

This disease was one of the most troublesome of those dealt with by the S.A. Veterinary Corps with the Southern Force. It first made an appearance at Upington before the Maritz rebellion,

and continued to account for a number of cases on the sick lines for the remainder of the campaign. The ordinary treatment was adopted and isolation strictly enforced. The mortality was 3 per cent. of the infected cases, a number of fatal cases being due to secondary infection. One of the chief difficulties experienced in dealing with this disease in South Africa is that it is not a disease of adolescence as in Europe, but attacks animals of any age. Total number of cases treated at base veterinary hospital, Upington, 459. Deaths 13.

Horse-sickness.

This disease appeared amongst the horses stationed along the Orange River during February and March, 1915, and was the cause of a very serious mortality, some units losing as many as 50 per cent. of their horses. As soon as the force moved off from the river towards the German South-West Africa border, during the latter part of March, the mortality perceptibly decreased and finally practically ceased. In standing camps and wherever possible, smearing with paraffin and the use of smoke fires were adopted with good results. It is difficult to estimate correctly the number of animals the Southern Force lost as a result of this disease during the campaign. Owing to the hurried purchase and mobilization of troops, it was impossible to devote sufficient time to immunize the animals against this disease.

Ringworm.

Ringworm was very prevalent during January, February and March, 1915. The usual treatment was adopted, and painting with undiluted hycol was found to be efficacious. Total number of cases treated at Upington base veterinary hospital, 260.

Piroplasmosis.

This disease was not troublesome at Upington, probably owing to the freedom of this district from ticks. The cases which occurred had chiefly been infected elsewhere. Trypan blue was used with good results, and the ordinary treatment with chloride of ammonia and extract of belladonna. Number of horses treated at Upington base veterinary hospital, 58. Deaths, 4.

Pneumonia.

This disease was very prevalent at Upington during the whole of 1915, especially amongst the debilitated animals returning from the Protectorate at the conclusion of hostilities. Post-mortems made on animals shot on account of having reacted to the mallein test also disclosed a large number of old lung lesions. The usual treatment was adopted. Number of cases admitted to base veterinary hospital, Upington, 253. Deaths, 51.

Sand Colic.

This disease was one of the most serious experienced with the Southern Force, especially amongst the animals returning from the

Protectorate. The shortage of forage during a considerable period accounted for this to a certain extent. Of the many treatments attempted probably that of mild doses of linseed oil, and enemas, was attended with most success. Number of cases treated at base veterinary hospital, Upington, 350. Deaths, 59.

Enteritis.

This disease was accountable for a number of deaths at various times during the campaign, and was in many cases due to injudicious feeding with mealies, wheat, etc. The ordinary treatment of linseed oil and tincture of opium was adopted with fair results.

Wounds and Injuries.

The number of cases always in the sick lines as the result of saddle injuries was excessive, and formed a very serious reflection on the horsemanship shown by members of the Southern Force. Lack of attention to saddlery, and bad types of privately owned saddles, also long marches without dismounting, were no doubt the causes of a large majority of these cases.

Northern Force.

The first portion of the Northern Force embarked and sailed from Capetown on the evening of December 21st, 1914, and arrived at Walvis Bay on the morning of December 26th, 1914. Three animal transports accompanied this force with approximately 2,000 animals on board. The veterinary arrangements were as follows:—One veterinary officer with a veterinary section on each transport, viz.: S.S. "Monarch," S.S. "Rufidgi," S.S. "Glenorky." Prior to leaving Capetown the necessary supply of drugs, instruments, etc., were issued from the base veterinary stores, and two full sets of veterinary hospital equipment and drugs were placed on board as a reserve for future requirements. The casualties on the voyage totalled six. This must be considered satisfactory, as some of the animals were kept on board for a fortnight before being disembarked. Delay was due to insufficient fresh water on shore, and also to the limited off-loading facilities. The casualties consisted of:—horses 2, colic (dead); horses 2, broken legs (destroyed); and oxen 2, red-water (died). A number of colic cases and minor injuries were treated during the voyage.

After landing, the animals rapidly lost condition. This was chiefly due to scarcity of water; the animals were only permitted to be watered once daily. The water was brackish, and many animals refused to drink for some days. Ultimately they took to it, and a rapid improvement in their condition was noticeable.

The ration scale for oxen was found to be insufficient as no grazing was available, and authority was requested and granted for an increase to 30 lb., which resulted in a marked improvement in their condition.

The total number of animals disembarked at Walvis Bay was 43,000. All animal transports arriving were visited by an inspecting veterinary officer, who reported on the condition, the number of the animals, and the number of deaths, together with any recommendations and suggestions.

Although full detailed instructions relating to animal management on board ship had been issued from the D.V.S.'s office, it took some time to instil into the minds of those in charge of animals the simple elementary but essential rules relating to feeding and watering. It was frequently found, particularly in the lower holds, that animals had not been watered, and mangers were full of mealies. This resulted in numerous colic cases. Occasionally too many animals were placed on board and were found packed in the gangways. As time went on, the condition of affairs improved, and during the last two or three months of the campaign very little fault could be found.

Generally speaking, the fittings in the transports were good. In some cases the stalls were too short and caused injuries to the chest and hind quarters; floor battens were omitted in some of the iron decks, necessitating the free use of ashes to give the animals a foothold.

The arrangements at Walvis for off-loading animals were good, although instances of carelessness occurred in the slinging overboard on to the rafts. On the transport "British Prince" there were special off-loading gangways which permitted animals to be walked from the ship on to the rafts. This is only possible in a smooth water bay such as Walvis.

Three months elapsed before the general advance took place. As more water became available, animals were permitted to drink twice daily, and were in excellent condition when they moved out.

Sand Colic.

During the time the troops were camped on the foreshore at Walvis Bay and Swakopmund, a large number of cases of sand colic occurred, due to the animals picking up food that had dropped on the sand. Many animals habitually licked the sand, owing probably to the presence of salt. Various preventive measures were enforced, such as aerial lines, tying up short, liberal ration of salt, feeding grain rations in nosebags, canvas mangers, and where possible galvanized iron mangers, but it was difficult to obtain sufficient of the latter for the number of animals. After leaving the foreshore the number of cases decreased, and the animals ceased to lick the sand.

It was reported that the most successful treatment for sand colic was liberal doses of linseed oil, chlorodyne, and bicarbonate of soda. Drastic purgatives were not successful and were discontinued. Ordinary colic cases were rare, and the good quality of the forage and systematic methods of feeding contributed towards this satisfactory state of affairs.

Pneumonia.

This was responsible for a number of deaths. At first these cases did not yield to treatment. This was due to the absence of suitable shelter. Stabling was eventually erected and resulted in a marked improvement. The weather during the day was hot and the nights were cold with heavy mists and fogs, with the result that animals embarking from the hot ship's hold on cold nights accounted for many cases. Some mounted regiments adopted the objectionable procedure of taking their animals into the sea in a heated condition late in the afternoons and, as the animals had not time to dry before sunset, many cases consequently developed. When this practice was stopped a further decrease in the number of cases was noticeable, and very few were reported after the advance began.

Strangles.

A large number of cases of strangles occurred in the Northern Force. The disease usually ran the ordinary course, and very few deaths occurred. As soon as a case appeared the animal was immediately isolated, and the disease did not interfere with troop movement.

Ringworm.

Ringworm was very prevalent in the earlier days of the campaign, but with isolation and treatment it gradually disappeared.

Horse-sickness.

Two cases of horse-sickness occurred at Walvis Bay during March, 1915. These animals had evidently contracted the disease prior to leaving the Union, as they both died two days after arrival. No cases occurred or were reported by the various veterinary officers with the mobile veterinary sections after the troops left the coast.

Biliary Fever.

Biliary fever was reported at Walvis and Swakopmund, but microscopical examinations failed to reveal the presence of the piroplasm. The disease seemingly was an acute jaundice accompanied by fever, and the affected animals rapidly recovered under treatment. The administration of calomel, salines, and quinine proved to be most successful.

Equine Influenza.

An outbreak of this disease occurred in the mounted regiment stationed at Fredericksvelde, a German stud farm. Treatment and isolation were rigidly enforced. The spread of the disease was arrested, and the mortality was nil.

Glanders.

Two outbreaks occurred prior to the advance. The first was a clinical case in the mounted brigade. Six hundred animals were

immediately tested. Three reacted and were destroyed. The second case appeared in a transport mule. Four thousand animals were at once tested, and forty-one reactors destroyed. On tracing the origin, it was found that all the reactors had arrived by the same boat ; and, as the conditions on board ship are ideal for the spread of this disease, it was fortunate that more cases did not occur. The attention of commanding officers was continually drawn in divisional orders to the danger of glanders, the symptoms, and the procedure to be followed.

Catarrh.

Nasal catarrh was prevalent amongst the animals. This disease was regarded as infectious. All cases were isolated ; it generally ran a mild course, and within an average of ten days the affected animals recovered.

Purpura Haemorrhagica.

Half a dozen cases were treated.

Laminitis.

The animals were remarkably free from this disease. Prior to the advance they were all in hard seasoned condition due to the fact that the burghers kept their animals constantly on the move while in camp.

Lameness for want of Shoeing.

A large number of animals were incapacitated from want of shoeing. A number of small mounted units arrived without farriers. The various veterinary sections assisted as far as possible in shoeing these animals.

Sore Backs.

The immunity of animals from sore backs revealed great efficiency in horsemanship amongst the burgher forces. When the mounted brigade moved out from the coast there were 2,000 animals left behind, and amongst these discards only a small number of sore backs were found.

Prior to General Botha's general advance from Swakopmund, great care was bestowed upon the animals, and when the first advance took place they were in superb condition. This enabled them successfully to undertake one of the most arduous campaigns on record for animals through desert country. For days they were without food and water, and when this was available it was only in restricted quantities. The mounted men outdistanced the transport, and it was impossible to get supplies forward. Very few animals were destroyed on trek. Large numbers fell out and were collected and sent back to Karibib. Owing to the difficulties in getting forward supplies of forage in sufficient quantity, the animals became extremely emaciated and useless for further service.

Eventually supplies of grain in regular quantities arrived ; but, as there was no grazing or other bulky fodder, the animals derived little or no benefit, and numbers of cases of colic occurred.

At the time of the second advance, the various mounted brigades were stationed along the railway line from Usakos to Windhuk. The latter place is about 240 miles from Swakopmund. There was a mobile veterinary section with each brigade. An interval of six weeks elapsed between the occupation of Windhuk and the second general advance northwards. This period was occupied in re-equipping the forces and in getting sufficient rations and forage forward from the coast. Some considerable time elapsed before the animals were placed on full rations, and at the time of the second advance the majority of the horses and mules were not in good condition, and could not be regarded as fit for the strenuous work in front of them. In places near the railway line a certain amount of grazing was available, but during the six weeks' rest this was eaten bare and the animals had to be trekked considerable distances for grazing. Owing to these circumstances, combined with the scarcity of water, their recovery was retarded.

When the second advance took place approximately 10,000 debilitated animals were left behind, 7,000 of which were in the vicinity of Windhuk. These animals belonged to the Southern Force and the 3rd Mounted Brigade. The other 3,000 were collected at Karibib and afterwards moved to Klein Aukas, near Usakos. Those in the Windhuk area were distributed over various farms and had to exist on any scanty grazing available. As a result their condition went from bad to worse. The 3,000 animals at Klein Aukas fared even worse, as grazing was practically non-existent and forage was unobtainable. All forage coming forward from the coast had to be sent north to the troops operating in the field. Recommendations were made by the A.D.V.S. to the effect that the 3,000 starving horses at Klein Aukas should be sent back to the coast, where large quantities of grain and forage were available, and eventually embarked and shipped to Capetown in the empty transports returning there regularly. For some unknown reason this recommendation was not adopted.

A large number of cases of clinical glanders were found from time to time amongst captured German horses. Instructions had previously been issued, and were frequently repeated in divisional orders, to the effect that all captured animals were to be isolated and malleined before being allowed to mix with Union animals, and that all stables were to be disinfected before any Union animals were stabled therein. Owing to the rush these orders were sometimes overlooked. In due course glanders appeared amongst the starving animals and spread rapidly. The veterinary officers in charge arrested the disease by testing and retesting with mallein. During this time some of the animals were reduced to eating their own dung, and some time elapsed before even halters were obtained to catch up the animals.

The veterinary distribution of the Northern Force was as follows:—

A.D.V.S., Northern Force, Windhuk.

One veterinary officer with veterinary section, Windhuk.

One veterinary officer with veterinary section, Klein Aukas.

One base veterinary hospital, Walvis Bay.

Four veterinary officers and mobile veterinary sections with the four mounted brigades.

One veterinary officer with the artillery.

One veterinary officer with the Imperial Light Horse.

One veterinary officer with the infantry brigade.

The advance north was a rapid movement, some of the brigades trekking over forty miles a day. The extreme point reached was about 250 miles north of the Swakopmund-Windhuk railway line. The transport was left behind in many cases ; and at the time of the surrender of the German forces the horses and transport animals were exhausted. Hundreds of animals dropped out and were left behind on the road ; they were picked up later by the various mobile veterinary sections and taken to places where water was obtainable. These animals were ultimately recovered and concentrated at the various depots which were formed.

Orders were issued for the troops to return to the railway, to leave their animals behind and proceed back to the Union for demobilization. The advance north was a rapid movement, but far less rapid than the return journey, which was completed in half the time, after the declaration of Peace ; and it was then that the greatest loss and harm befell the animals. It is impossible to describe the state of the animals on their return from the north of German South-west Africa to the railway line, a distance, as already stated, varying up to 250 miles. It was a case of the survival of the fittest. Riders left their horses anywhere on the veldt, and many returned on empty transport wagons. Mobile veterinary sections did not arrive for a week or ten days after the brigades reached the railway ; they were delayed by collecting the knocked-up and worn-out animals en route, and were the means of saving large numbers of animals.

Collecting Stations and Concentration Camps.

These were established at the following places : Otavifontein, Kalkfeld, Omaruru, Karibib, Usâkos, Klein Aukas, Okahandja, and Windhuk, in connection with the Northern Force ; and at Rehoboth, Keetmanshoop, and Kume, in connection with the Southern Force.

At this time it was difficult to obtain the correct total number of animals in the Protectorate, as large numbers belonging to the Southern Force were passing through Upington on their return to the Union, but the approximate number was 60,000, made up as follows :— 43,000 arrived at Walvis from the Cape ; approximately 5,000 animals were taken over from the Germans at the time of the surrender ; and roughly 12,000 animals belonging to the Southern Force were still in the Protectorate.

After the return of the men to the Union, which was effected in record time through the splendid organization on the railway and the lines of communication working without a hitch, a breakdown on the railway services followed with disastrous results. The transport and remount departments were faced with the problem of having 60,000 more or less debilitated animals on their hands in the various camps in the desert with practically no food with which to feed them. The railways were unable to deal with the congested traffic. All chartered transports with the exception of two were released. The animals were in too debilitated a condition to trek to the Union, a distance varying up to 750 miles, part of which was through a waterless desert. Attempts were made to trek the animals from Usakos to Walvis on the coast where thousands of tons of feed were stored, but the route was strewn with carcasses.

The railway authorities worked hard, but, although they frequently promised that ample supplies of forage for the animals would be forthcoming, these did not materialize; and during this time many animals were slowly dying from starvation in the various camps. The officers in veterinary charge of each depot continued to send urgent telegrams daily to the effect that rations were not coming forward and that animals were dying from debility; the survivors were reduced to such a low condition that it took some months for them to recover. This was during the months of July, August, September, and October, 1915, and it was not until November that anything in the nature of sufficient supplies were available.

The remount authorities decided to distribute the animals over farms, but owing to their weak state they were unable to travel. As previously stated, in many instances they were reduced to eating their own excreta. On some of the farms to which animals had been sent grazing was scanty, and they had to travel ten to fifteen miles to water; in many cases the water supply was insufficient and the animals either remained stationary or lost condition.

An epidemic of lice broke out, but this complaint was soon remedied by dipping and spraying.

During the four months referred to after the cessation of hostilities several thousand animals died from starvation or were shot for debility in the various camps, and thousands were reduced to an extremely low condition.

The veterinary officers stationed in the captured territories after hostilities had ceased carried out their duties under the most trying conditions with cheerfulness and showed great endurance, although they all placed on record the fact that they were helpless, and disclaimed any responsibility for the starvation of the animals.

Demobilization of Animals.

The Director of Veterinary Services arrived at Luderitzbucht on August 12th, where he inspected the remaining animals and gave instructions regarding their return to the Union; also all veterinary equipment. He further inspected various large stores

of forage and grain of good quality, amounting to some thousands of tons, at the supply depot.

At 9 p.m. on August 13th he arrived at Walvis Bay, and on August 14th inspected the transport "*British Prince*" which was on the point of leaving for Capetown with 1,500 animals on board.

On August 15th, 1915, he inspected the base veterinary hospital at Walvis, and the remount camp with some 700 mules. As the water supply had failed at Walvis, 350 animals were trekked to Swakopmund and a depot was temporarily re-opened. It may be recorded here that the information current at that time was that Walvis and Swakopmund were being closed down, and that all animals left behind by the *British Prince* were to go overland. Other arrangements were subsequently made, and about five more trips were made by animal transports.

There were huge quantities of forage and grain at the supply depot amounting in all to about 15,000 tons; all of good quality.

At midnight the D.V.S. left for Swakopmund and proceeded to Usakos, arriving at 6 p.m. on August 17th. The veterinary establishment stationed there comprised two officers with Veterinary Section "E." One officer with Veterinary Section "6 (b)" was at Klein Aukas. The sick animals at Usakos were under satisfactory treatment; fifteen were isolated for skin disease. Orders were received that the *British Prince* was to make one more trip, and 500 burghers' horses were despatched from Usakos to Walvis. Some of the animals arriving from up country were in fair condition, but the general complaint was that no regular supplies of forage were coming forward and that animals were going back in condition. The majority were in an extremely emaciated state. It may be mentioned here that the various sidings along the railway were full of train-loads of forage, unable to move owing to the broken-down engines.

From Usakos the D.V.S. proceeded to Karibib, Okahandja, and thence to Windhuk.

On arriving at Windhuk on August 21st, 1915, he immediately interviewed the military governor and also the assistant quarter-master-general, and pointed out that the serious condition of affairs must inevitably lead to a grave crisis. It was evident that in a very short time the mortality from starvation would be heavy, as animals were already losing condition rapidly in the various depots; many of them were dying from starvation; and outbreaks of glanders and other diseases were likely to follow unless the matter was at once remedied.

The military governor despatched a number of telegrams to the Railway Board, the Director of Railways and the Assistant Director of Military Railways, requesting an immediate consultation. The A.Q.M.G. stated that he had made continuous representations to the railway companies on these points.

From that day things went from bad to worse, and the forecast was fulfilled.

It was also reported that on many occasions the railway authorities had promised to remove to the Union a specified number of

animals daily. These were accordingly collected for removal, but owing to engine trouble the authorities were unable to carry out their promise, and the animals were again left to die of starvation and insufficient water supply. It should, however, be borne in mind that the whole population, military, civilian, and native, were dependent on the railway for rations and were entitled to first preference. This work in itself constituted a formidable task.

It was ultimately decided by the remount authorities in the Protectorate to trek the animals down to the forage lying at the coast, as it was found impossible to bring the forage to the animals ; large numbers were accordingly trekked to Swakopmund. Owing to their wretched condition, this move entailed a heavy mortality, and increased the risk of a spread of glanders.

The veterinary services dealt strenuously and energetically with all forms of disease, and while working under grave disadvantages succeeded in controlling and eradicating the outbreaks.

The mortality from starvation and the diseases following in its train, e.g., glanders, was approximately 6,000 animals. A total of 46,682 animals were tested and re-tested with mallein in South-west Africa at twenty-two different centres, with the result that 3,313 reactors and 840 clinical cases were destroyed, a large proportion of which were German horses.

It may be mentioned here that it was alleged in some quarters that the enemy subjects wilfully spread glanders amongst the animals. The disease also broke out amongst the transport donkeys numbering about 4,000 at two different centres, and about 106 were destroyed. Owing to the acute and rapid course of the disease in donkeys the mallein test was found to be most unreliable, and it was therefore decided to distribute them in small lots over a large grazing area. This had the desired effect, and the disease entirely disappeared.

The veterinary services undoubtedly saved the situation under distinctly unfavourable conditions, and prevented the remaining 42,429 equines from being entirely wiped out. They eradicated contagious diseases and successfully and efficiently prevented their spread and introduction into the Union. They are deserving of the highest praise that can be bestowed upon them for having in the face of great difficulties ultimately mastered the outbreaks and saved such a large percentage of animals. To them is due also the credit of minimising the financial losses and of contributing in a great degree to the prevention of waste.

On August 22nd, 1915, the D.V.S. had an interview at Windhuk with the special remount officer and the A.D.V.S. The special remount officer stated that he had been specially appointed to deal with the removal of all animals in the newly acquired territory, and that he had full powers to make the necessary arrangements for their disposal or return to the Union. Before commencing movements, he was making a general survey and did not wish interference from outside sources. The matter was therefore left entirely

in his hands. The special remount officer was asked to communicate his arrangements to the A.D.V.S., so that the veterinary staffs could be detailed where necessary. The A.D.V.S. was instructed to proceed with the horse-sickness immunization of all mules detailed for permanent duty in the captured territories. The necessary serum and virus were forwarded, and this work was in due course completed with satisfactory results.

An inspection was made of all veterinary stores, veterinary units and captured pedigree stock, including stallions, cattle, and karakuil sheep, which were under the care of the S.A. Veterinary Corps pending their transfer to the civil authorities. Members of the S.A. Veterinary Corps saved the karakuil sheep from slaughter for food purposes. Serjeant M. Goldberg of the S.A.V.C. took an active part, and later Major E. W. Hunt, of Hunt's Scouts, energetically took up the work and traced and recovered many of the sheep which had been distributed by the German Government over various farms.

On the afternoon of August 22nd, 1915, inspection was made of the flock which was then under the charge of Serjeant Goldberg at the Government farm, seven miles outside Windhuk. All records and pedigrees were being carefully preserved for handing over to the civil authorities. A minute and detailed inspection was also carried out of the Gamams Veterinary Bacteriological Institute, which was also being carefully guarded for handing over to the civil authorities.

Having completed the necessary veterinary arrangements for the occupied territories, the D.V.S. left Windhuk on August 23rd, 1915, arrived at Rehoboth in the afternoon, and inspected the veterinary details. The officer in charge was instructed to close down, forward his animals to Windhuk, and proceed to Kums.

On August 26th, the D.V.S. arrived at Upington and inspected the base veterinary hospital and the malleining operations; also the arrangements in force for the examination and testing of all animals entering the Union through this depot. 15,000 head of cattle were then under quarantine prior to entering the Union.

On August 27th, 1915, the D.V.S. arrived at Prieska, and from there returned to headquarters.

The veterinary units at the following depots were demobilized and closed down :—

Tweespruit Remount Farm.	Parow.
Standerton Remount Farm.	Papkuil Farm.
Tempe.	Bushmansputs.
De Aar.	Kuruman.
Draghoender.	Warrenton.
Border.	Fourteen Streams.
Potsdam.	Kroonstad.
Mellish's Farm.	

The base veterinary stores were transferred from Capetown to Johannesburg.

On January 12th, 1916, the D.V.S. attended a conference at Upington on the closing down of all remount depots in the occupied territories and the handing over to the civil authorities of a veterinary, transport, and remount establishment. On January 17th, 1916, the base veterinary hospital at Upington was closed down. On January 19th, 1916, arrangements for the closing down of No. 5 Base Veterinary Hospital, Capetown, were completed.

As a precautionary measure against the spread of skin disease, a dipping tank had been erected here and the following dip used :—

Arsenite of soda (80 per cent.)	..	8 lb.
Soft soap	.. .. .	4 lb.
Paraffin	.. .. .	2 gallons.
Water	.. .. .	400 gallons.

Altogether 20,432 animals were dipped, with only six accidents. This had a very marked effect in improving the general condition of the animals and in freeing them from lice, ticks, and ringworm.

Intrapalpebral Mallein Test.

The advantages of this method of testing were found to be as follows :—

- (a) It can be applied to a large number of animals quickly.
- (b) It can be applied to animals irrespective of high temperature, or in the presence of other disease.
- (c) Temperatures need not be taken to arrive at a diagnosis.
- (d) The test can be repeated within twenty-four hours if necessary on the other eye.
- (e) The reaction is more characteristic and delicate than that obtained with the subcutaneous method.

Nine thousand animals were tested by this method at Capetown and 864 reactors destroyed. It is possible for a veterinary officer to do 1,000 animals in a day ; it can be repeated at any interval ; the number of doubtful reactors is small.

As animals were passed through the final mallein test at Kimberley they were distributed throughout the country for the purpose of sale.

In addition to the small animal losses sustained in this campaign, another notable feature was the success achieved by the South African Veterinary Corps in eradicating all contagious animal diseases in the captured territories. Not only those referred to in this report, but also other cattle plagues such as pleuro-pneumonia, anthrax, etc., which had made an appearance amongst the civilian and native stock. The veterinary organization and procedure prevented the spread of any contagious disease to live-stock in the Union. This work was duly acknowledged by the civil government Veterinary Department ; and it may be added that this forms an outstanding contrast to the history of former African campaigns, which have invariably spread contagious animal diseases broadcast in their trail.

The veterinary organization created not only met all the veterinary requirements during hostilities, but in addition the

Defence Force now possesses a Veterinary Corps with mobilization stores, equipment, the most modern microscopical appliances, up-to-date surgical instruments, and a field veterinary laboratory, etc., complete and ready for any future emergency. These are held for the following units :—

1 base depot of veterinary stores.*

1 base veterinary hospital.

12 mobile veterinary sections,

and are intended to provide veterinary services for all the military districts in the Union of South Africa.

UNION DEFENCE FORCES, 1914-1916.

LIST OF VETERINARY OFFICERS.

Director of Veterinary Services.

Colonel James Irvine Smith.

Veterinary Hygiene and Sanitation Specialist.

Lieut.-Colonel C. E. Gray.

Assistant Directors of Veterinary Services.

Lieut.-Colonel J. G. Bush.

Major G. T. Cannon.

Lieut.-Colonel G. W. Lee.

Major B. Runciman.

Majors.

Amos, S. T.

Jowett, W.

Collyer, J. B.

Sharpe, C. M.

Captains.

Andrews, W. H.

Kellett, E.

Brogan, C. H.

McCall, D. B. J.

Cunningham, M.

McCall, G. R.

Crowhurst, J. W.

McNeil, J.

Clemow, E. T.

McGregor, J. G.

Dunning, F. J.

Myhill, B. A.

Donaldson, J.

McKie, W.

Dykins, W. A.

Pilkington, J. K.

Elley, S.

Peddie, J.

Forrest, J.

Quinlan, J.

Goodliffe, G.

Strachan, C. H.

Goodall, A.

Skues, E. N.

Harber, A. F.

Stokes, E. E.

Howie, A. M.

Thompson, J.

Hodder, A.

Viljoen, P. R.

Joyce, J. F.

Wadlow, C. H.

Johnston, S. I.

Worsley, J. A. (*Died on Active Service*).

1 Base Veterinary depot.

1 Base Veterinary Store.

8 Base Veterinary Hospitals.

15 Mobile Veterinary Sections.

CHAPTER XVII.

THE VETERINARY SERVICES IN EAST AFRICA.

THE termination of the East African campaign found the Veterinary Services in possession of added scientific knowledge of parts of British East Africa, the whole of German East Africa, and those parts of Portuguese territory where the British followed the German forces.

The fighting in British East Africa was entirely confined to the native reserves along the Anglo-German frontier. Pre-war veterinary work was mainly confined to the areas of European settlement; consequently very little was known about the conditions to be expected in the area of operations. For instance, the only report available with regard to horse-sickness was to the effect that the country south of Kajiado and around Longido was deadly for horses. This subsequently proved to be the healthiest area for mounted troops, and thousands of horses and mules were used there.

There were accurate maps showing tsetse fly areas compiled by the Protectorate Government Entomologist.

Of German East Africa a certain amount was known. The German government periodically sent veterinary officers for a course of study with the veterinary department at Nairobi veterinary laboratory. An interchange of animal disease returns had been instituted between the governments; indeed two weekly returns were received with German thoroughness after the outbreak of war. A fairly reliable map showing animal diseases by districts had been presented to us by the German chief veterinary officer and proved to be most useful.

Of the animal diseases of the parts in which our troops operated in Portuguese East Africa, nothing was known. No one in the East African Veterinary Service had met a Portuguese veterinary officer or had heard of the existence of such a person for the control of animal diseases in their hinterland.

Speaking from the broader aspect of the campaign the greatest impediments to all domesticated animal life on the East Coast of Africa, embracing British, German and Portuguese territories, are the enormous tsetse-fly-infested belts of country extending inland from the coast for varying distances up to 250 miles or until an altitude of 3,000 feet is met with, when these areas, so fraught with danger to domestic animals, become small, isolated and limited in extent. In some of these belts the tsetse flies would seem to lie dormant in the puparium during mid-winter and dry months, springing into activity at the onset of the rains and hungrily pursuing any animal life that may disturb them. Proceeding further inland from these coastal fly-belts the country is practically free from tsetse fly, and rises in British East Africa to an altitude of

8,000 feet above sea level. This zone in British territory embraces some of the finest stock land in the world, where the absence of cold winters makes for a cheapness in cattle production not to be experienced in any other country. Further south, however, where the areas of high altitude are not so great, country free from the tsetse fly is less frequently found. Further west from the pastoral belt in British East Africa, the country falls in the direction of the great lakes, where again the dread glossina abounds on lake shore and river bank. Fly-free areas are to be found, however, north of Lake Tanganyika and between Lakes Nyassa and Tanganyika.

In Portuguese East Africa the same fly-belts cover practically the whole province of Nyasa. Mozambique has an extensive tsetse fly infected area embracing nearly the whole of that province from about seventy miles inland and covering approximately sixty by one hundred miles of country. This fly-belt stretches across the Ligonya River to the neighbourhood of Alto Moloque, and about twenty miles south into the Zambesia Province, where there is one other small infected area around Ille.

Horse-sickness was encountered practically everywhere in the wet seasons, and near water and swamps in dry weather.

The soil of East Africa is heavily infected with a large variety of pathogenic organisms ; wounds, especially of the extremities, become quickly a favourable multiplying ground for preiz-nocard bacilli, the bacillus of necrosis, many pyaemic bacteria, and more rarely anthrax. The occurrence of the amblyoma tick, with its long rostrum, complicated matters by mechanically introducing organisms of telluric origin.

The deadly bovine scourges, rinderpest and East Coast fever, were more or less enzootic over the whole fly-free area of hostilities ; they caused the greatest anxiety and a very great deal of work to the veterinary services in order to safeguard the meat supply. Cattle were purchased in the native reserves and forwarded by rail and road to the troops. Sheep were a constant worry. The native sheep in these parts do not stand hardship well, and soon succumb to any undue strain on their constitutions. Internal parasites were widespread.

Hospitals demanded fowls in large numbers. Avian-diphtheria, pneumo-enteritis, parasitic affections, all enzootic in the country, soon claimed the attention of the veterinary service to alleviate losses.

The diseases imported by the army to such a disease-ridden country were negligible. Glanders, strangles, epizootic lymphangitis, and a catarrhal pneumonia of asses did, however, occur, but never assumed any serious proportions.

Some idea of the magnitude of the task that faced the veterinary services can be gleaned from the foregoing remarks. The limitation of equines to the fly-free areas was the only possible advice, if mounted troops were to be used at all. From the beginning of the war until early in 1916 it was found possible to adopt a policy based

on this advice, with the result that, throughout a period of comparative inactivity, approximately 20,000 animals were used by the forces with a very small death rate.

From March, 1916, onwards, the limiting of animals to fly-free areas was abandoned, resulting in a wastage of practically 100 per cent. of the animals in the field. In reply to a question from the Director of Remounts, the veterinary service estimated the wastage to be expected at 30 per cent. per month, with an ultimate dead wastage of 100 per cent. for all animals in the force. It was anticipated that veterinary measures, when carried out, would keep infected animals workably fit for a considerable time.

It was possible, however, to conduct a campaign with mounted troops in the fly-free areas of East Africa, and keep wastage down to normal proportions. This was evidenced during the period August, 1914, to March, 1916, as well as during the Naumann round-up in 1917 based on Dodoma. During these latter operations, when Naumann with a strong force had slipped round the Iringa column and recrossed the central railway near Itigi, he was finally brought to bay by a force composed of :—

10th South African Horse.

1 company K.A.R.M.I.

De Jagers Horse,

and a mountain battery.

Naumann's force and our pursuing force covered approximately 1,000 miles by circuitous routes, where mountain paths and bush facilitated his disappearance. His reappearance at long distances caused a great strain on mounted troops, leading to loss of condition amongst the horses. Throughout this side issue to the campaign which went on for months, the permanent wastage was 9 per cent., and all temporary unfit animals were re-issued after treatment.

Pasture grasses, on the areas of a 15- to 25-inch rainfall which comprise most of the ranching country, are green for about three months, then drying off, but remaining full of nutriment for about six months, when the feed value is diminished as the grasses become withered and fibrous. At low altitudes with a rainfall up to fifty inches the grass is reed-like, broadly spatulate, and digestible up to about three months old, when it becomes too fibrous for domesticated herbivora, and only the young tips have any food value. It is a common custom of the natives to burn the pasture when possible, as afterwards green shoots are very quickly sent out from the old roots. These young shoots are very palatable, but highly laxative, and consequently dangerous to working animals, especially those in low condition. The best feed is always to be obtained on old cultivated lands near villages where a good couch grass is invariably found.

A number of poisonous plants were detected in various parts of the country. They were chiefly *senecio* (ragworts); *iridaceae*; *lilicaceae*; *datura*, and *schinus*.

Water conditions varied greatly with localities. The healthiest parts for horses were always the driest. Wells and springs, when found, were unadapted for animal requirements without development. When running water was available, a hard bank or firm sandy stretch was chosen for an animal drinking place. Steep approaches were cut away if necessary. When rivers of small volume had to be utilized, pumps and tanks with troughs and piping were always necessary if large numbers had to be watered.

The quality of river water was invariably good, but curious conditions were often noted where water pans or small lakes were used for drinking purposes. The water of a lake might be quite palatable and harmless at one place, yet so full of alkalies at another as to act as a strong purgative. Animals in low condition might be rendered unfit to take the road after drinking a quantity of such water. The difference in the water at these places was probably due to a fresh inrush from some subterranean source.

Boring plants were frequently used during the campaign. The best water was usually to be found on the first or second layer of an impervious stratum. When sinking proceeded deeper, a stronger supply was often obtained, but it might be so impregnated with magnesium, potash, calcium, or soda, as to be of little service. Some bore holes supplied good palatable water until pumping was excessive, when an inrush of salines would occur. Others yielded a good sound water until the advancing dry season causes a concentration of salines. That such a concentration could be very local was shown by two springs at Dodoma remount depot. These supplies were in close proximity, yet one of them could not be used owing to the presence of magnesium and sodium in large quantities, while the other was a normal water.

The more important parasitic flies met with during the campaign were :—

Glossina Morsitans.

„ *Fusca.*

„ *Longipalpis.*

„ *Brevipalpis.*

„ *Palpalis.*

„ *Pallidipes.*

All were transmitters of the dread trypanosome. Various pangoids, tabanids, stomoxyds, and hippoboscids were all suspected of being capable of carrying trypanosomes to healthy animals; the latter (hippoboscids) was blamed for *T. theileria*.

Maematopotes and chrysops were also under suspicion as trypanosome carriers, and oestrids, culicids, stigomya, anopheleds, pyretophorids, and cellia, in the carrying of horse-sickness.

Of the pathogenic ticks, the following were the most commonly met with :—

Eurecephalis appendiculatus, *simis* and *evertsi*, all convicted of carrying East Coast fever, and the last named biliary fever of horses. *Hyaloma aegyptium* also capable of carrying equine piroplasmoses,

euricephalus pulchellus and two varieties of bont tick, whose long probosces were principally concerned in transmitting septic organisms, as well as being concerned in big losses of sheep from heartwater. Mangaropus decoloratus, a conveyer of bovine redwater and angus persicus, a transmitter of avian spirochaetes.

Animal Management.

Criticism on the disregard of expert advice, in connection with the management of animals with units in the field, would fill more than a large volume. Those noted here are the principal faults stated in a general way, with no intention to particularize or incriminate any units or individuals but with the purpose of making the record of value for future use. In referring to them in the face of the enormous mortality from trypanosomiasis, it may be argued that nothing could have made any difference as all the animals would inevitably die. While not disputing the ultimate fate of the animals there can be no question that an observance of the advice of those whose duty it was to advise would, by lengthening the period during which animals in the field remained serviceable, have reduced the number of reinforcements required. It is a matter of opinion, but it seems safe to say that one half of the horse, mule and donkey reinforcements demanded during 1916 would not have been necessary.

A point to be borne in mind in the consideration of this question is that the horse age has given way to the mechanical age, especially in South Africa, from where the majority of our troops came. It is less difficult to find a man who can clean a sparking plug than one who can adjust a saddle or bridle in a workmanlike manner.

Then again the ease with which the South African troops galloped over the sandy deserts of German South-west Africa, in the campaign immediately preceding that in East Africa, carrying all before them in a country comparatively free from animal plagues, gave them a misplaced confidence in their ability to do the same in East Africa.

Internal regimental organization appeared to be decentralized to a great degree. Squadron, and often troop, leaders, seemed to be allowed unusual discretion in this respect. Consequently, it required more than human powers on the part of a regimental veterinary officer to get any instructions issued that would react throughout a regiment. Two illustrations will serve to explain the attitude of the entire force to veterinary administrative measures during this period of the campaign.

(1) To prolong the life of army animals exposed to the risk of being bitten by tsetse flies, arsenic was issued by the Veterinary Service. For easy distribution, and to avoid errors in dosage, the drug was dispensed in compressed tabloids. The practice ordered by veterinary officers was to crush the tabloid and sprinkle the powder on some foodstuff. The tabloids, however, were rarely, if ever, crushed; they usually sank whole to the bottom of the nosebag where they remained unconsumed, as evidenced on one occasion when an officer ordered the collection of the unconsumed rations in

nosebags for distribution amongst some late arrivals. These few unfortunate animals all received poisonous doses of arsenic.

(2) A senior officer, on one occasion, personally inspected a large number of horses isolated at a base depot on account of strangles. He selected 450 of them and, against the advice of the responsible veterinary officer, sent them 250 miles by road to join a brigade at the front. Fifty-five of these animals died on the road, and the remainder were declared to be useless on arrival.

To go down the scale of faults causing unnecessary wastage in animals, the following points may be mentioned :—

The technical personnel—artificers, e.g., shoeing-smiths, saddlers, etc., were looked upon as useless encumbrances by mounted regiments. They were invariably left behind at the first opportunity. Remonstrance by the regimental veterinary officer was not only useless but, when persisted in, resulted in his transport animals being taken for other purposes.

Horsemanship and ability to look after animals properly were poor amongst the mounted regiments from South Africa, as the following comparison indicates. During October, 1916, 1,720 horses and mules were taken over at remount depots and conducted forward by regimental personnel. The distance was approximately 200 miles. One hundred and fifty-five animals were lost en route. During the same period, 2,528 horses and mules were conducted forward by remount personnel over the same route without the loss of a single animal.

These points are mentioned solely with a view to making clear the effects on the animals of all the circumstances of the campaign.

Animal Rations.

While animal rations of good quality were always available at the various bases and on lines of communication, the difficulties of transport up to early in 1917 made it impossible to get grain forward for animals in the field. But, when the two mounted brigades had returned to South Africa, the transport was sufficient to feed the smaller number of animals. Starvation in the earlier period played a big part in the heavy wastage experienced during the campaign.

Subsequent to March, 1917, the average quarterly wastage was :—

Horses	..	..	38·7 per cent.
Mules	..	..	32·3 „
Donkeys	..	..	36·8 „

(note original estimate of 30 per cent. given by Veterinary Service).

During the earlier period March, 1916, to January, 1917, it was practically 100 per cent. per month.

Trypanosomiasis.

The following trypanosomes were detected and reported by veterinary officers :—

T. brucei ; T. dimorphon ; T. vivax ; T. pecaui ;
T. rhodesiense ; T. gambiense.

The latter two were also reported by medical research officers.

The largest mortality from this disease was experienced at low altitudes. The geographical distribution of the most virulent forms of the disease which caused animals to lose condition rapidly and succumb in a few weeks, was :—

- (a) Inland from Lindi.
- (b) In the Nyasa Company's Territory.
- (c) On the Kilossa-Mahenge Road.

The last embraces an up-country area with an average altitude of under 3,000 feet, with a very hot humid climate.

The types of the disease met with in 1916, during the initial advance into German East Africa down the Usambara Valley and across from the Pangani River to the Central Railway by Korogwe and Handini, were much slower in their action, and the process of emaciation was not nearly so rapid. In the Ruipa area of the Iringa district, Kondoa Irangi, and Masai Steppe (all, more or less, high inland country), a mild type of the disease was met with. Some time after infection, blood examinations became negative, bodily condition returned and animals apparently recovered.

Two points noticed by veterinary officers in the field were :—

(1) The more frequently animals passed through a fly-belt, the greater became the intensity of infection. This was apparently due to a larger number of flies being infected and an increased pathogenicity of the parasite.

(2) Experience in the campaign would appear to lend colour to the view that some trypanosomes are transmissible according to the host they are discharged into by tsetse flies.

Methods employed to lessen mortality in fly-belts.

(a) *Preventive.*

(1) Traversing fly-belts by night. This was not always successful for avoiding attacks by tsetse flies. On bright moonlight nights it was usual for tsetse flies to bite ; even on dark nights they will follow animals if disturbed and they happen to be hungry.

(2) It was noticed that animals placed in the rear of a column, e.g., ambulance mules and troop horses of the rear guard, appeared to suffer more from annoyance by tsetse flies than the advance guard and main body. Further, it was subsequently found that any unit bringing up the rear had the highest percentage of infected animals. To alleviate this condition, the large number of slaughter cattle, which usually trekked with columns, were relegated to the rear. As they would be eaten before the disease could develop, the economy of transferring the inevitable high infection from the working animals is easily appreciated.

(3) Grazing in open spaces as much as possible. Tsetse do not venture out into open windswept spaces. Animals had to go close to the bush to be bitten.

(4) Banks of rivers were especially infested. The practice of burning bush and grass when possible was resorted to on river

banks. The smoke screen thus established would allow the animals to water in peace.

(5) Many external applications were tried without success. Any agent that would act as a deterrent to tsetse flies would also seriously impair the animal's usefulness.

(b) *Prophylactic Medicine.*

As an inhibitive to the progress of the disease, a daily sublethal dose of arsenic was advised. A 5-grain dose was the rule, but it was increased to 10 grains with success when it was possible to give animals a full ration. The consensus of veterinary opinion was that, so long as nutritive food was available, arsenic was undoubtedly most valuable in prolonging the usefulness of infected animals, but was of little service otherwise. In the mild form of the disease already mentioned, the exhibition of a combination of arsenic, mercury, and iodine gave excellent results.

Entomologists were employed with the force for a time, but as, under the conditions prevailing, their recommendations could not be followed, surveys were discontinued.

Horse-sickness.

Next to trypanosomiasis, this disease caused the greatest loss.

Like South Africa, the more northern parts of the continent have their horse-sickness seasons. How far north this disease exists has not, as far as is known, been definitely defined, but it was prevalent in the rainy seasons over the entire area covered by the East African Expeditionary Force. The incidence of the disease at coast ports, on the low-lying coast belts and up country where the nature of the soil and the "lie" of the country tended to collect moisture, was always most pronounced. As is well known, the disease does not lend itself to curative measures.

Amongst the preventive measures resorted to may be mentioned :—

(1) Abandonment as far as possible of animal depots and camps at the coast and other positions likely to be dangerous during the rainy seasons.

(2) Smoke fires to the windward of all horse and mule lines. The benefit obtained from this protection is readily appreciated if the restful appearance of animals in a smoke protected camp is compared with the disturbed state of those not so protected.

(3) As nocturnal winged insects, especially mosquitoes, are suspected of being carriers of the disease, drainage and sanitation generally are the most necessary of all precautions. By limiting the breeding places of these insects, great reductions in their numbers can be effected. These measures, in conjunction with the smudge fires, can work wonderful improvements on unsuitable sites when the choice of camping places is limited for military or other reasons.

Veterinary sanitation was practised by regimental veterinary officers. The appointment, to divisions, of a veterinary sanitation

officer with wide powers would have increased the efficiency of veterinary measures. The medical services have found this necessary, and it is only reasonable to suppose that a hard-worked officer commanding a hospital may overlook small details of sanitation and would welcome the assistance of a sanitation expert.

(4) Care in selection of depot and camp sites. As well as observing the usual precautions, open, treeless, windswept areas, if possible above the immediate surrounding country, were selected. Differences of opinion sometimes arose between the medical and post or camp authorities on this question. These officers were generally under the impression that any spot, regardless of the health of animals, the water, transport or other matters of importance must be accepted without demur by the officer commanding animal units.

There is a reason on the part of medical sanitation officers for endeavouring to keep animals as far away as possible. Animal lines are credited with creating flies and foul odours, and carry this stigma regardless of whether they are veterinary or regimental units. Unfortunately such complaints are not always groundless, and this point merits the attention of veterinary sanitary science.

(5) The keeping on of nose-bags at night when on patrol was practised to some extent, but there is no reliable information available on this point.

A certain number of horses and mules were immunized against horse-sickness by the veterinary authorities in South Africa before being sent up to the force. It is to be regretted that no reliable information with regard to these animals could be obtained from units in the field.

Rinderpest.

This disease was widespread throughout the whole of German East Africa. It menaced the collection and distribution of slaughter stock so seriously that this all-important work could not have been carried on without very active veterinary assistance. Owing to the enzootic character of the disease, districts differed widely, necessitating the most careful arrangements of routes by veterinary officers to safeguard the health of the animals. Constant movement of both military and native cattle caused ever-increasing changes in the situation; and the veterinary administration was taxed to the utmost in dealing successfully with the hundreds of thousands of cattle purchased and issued to the troops. That the results were successful and that mortality was kept low, can be seen from the returns of the livestock branch of the supply and transport.

The measures adopted to cope with the disease were :—

(1) Careful veterinary instructions, confining purchases to specified districts and regulating stock routes.

(2) Prophylactic inoculations conferring :—

(a) *Active immunity*, chiefly used in the case of oxen required for transport purposes.

(b) *Passive immunity*, chiefly used for slaughter stock.

The anti-rinderpest serum for these inoculations was manufactured at the Veterinary Laboratory, Nairobi.

East Coast Fever.

This was the most difficult bovine disease the Veterinary Services had to deal with. The only sound policy to adopt in controlling its ravages amongst susceptible stock is dipping in a tick-destroying solution. Therein lay the difficulty. The transport of anti-rinderpest serum and hypodermic syringes to combat outbreaks of rinderpest was simple. To erect cattle dipping tanks over large areas to be used for a short time only was obviously impracticable. Some other means had to be adopted. The complication of enzootic and non-enzootic areas, coupled with the insidious slow-maturing virulence of outbreaks which characterizes this bovine scourge, made exhaustive veterinary surveys necessary to cope with the ever-changing situation, as fresh purchasing areas were required. Adult stock from enzootic areas could pass through non-enzootic areas without risk of spreading infection. Susceptible stock from non-enzootic areas were a different proposition, and the selection of routes for these presented the greatest difficulty.

The operations of purchasing officers depended therefore entirely on the Veterinary Services. Special veterinary officers were told off for this work; they reported the results of their labours to veterinary headquarters, who in turn advised the livestock branch of the supply corps concerning the areas for purchase and stock routes to be used for concentrating purchased cattle and sheep. It will be seen that the livestock purchasing organization was a complex one. Although nominally under the control of the supply corps, its existence was entirely dependent on the Veterinary Service, and it could only operate under its guidance.

As mentioned elsewhere, the livestock organization was part of the Veterinary Services until early in 1916, when it was handed over to the Army Service Corps. Subsequently (in 1917) executive assistance was again asked for from the Veterinary Services, and purchase was recommended by veterinary officers who were attached to the Director of Supplies and Transport.

From this it is clear that in Africa, where the conditions of disease are so baffling to any but trained veterinarians, the purchase of livestock should be an integral part of the veterinary organization.

Anthrax.

This disease is enzootic in many parts of East Africa. Its chief importance lay in the danger of its transmission to the troops. It was a continual source of anxiety in that it was met with at practically every centre of concentration of slaughter stock. On the Central Railway line outbreaks were recorded at Mangoni, Bahi, Godegode, Dodoma and within easy reach of the railway at Nyangalo and Mpapua. It also occurred at the important centre of Iringa which was the advanced base for operations in the Mahenge area.

Protective inoculation was tried as a means of coping with the disease, but it was difficult to obtain a reliable vaccine and the method was abandoned. Constant vigilance, careful inspections, combined with the use of the clinical thermometer, were relied on entirely in dealing with outbreaks.

It is greatly to the credit of the Veterinary Services that not a single case of anthrax was recorded amongst the troops who handled and ate meat from thousands of local cattle.

Animal Wastage.

As at the end of the campaign there remained only—

<i>Horses.</i>	<i>Mules.</i>	<i>Donkeys.</i>
827	897	1,402

out of a total of approximately

<i>Horses.</i>	<i>Mules.</i>	<i>Donkeys.</i>
31,000	33,000	34,000

employed with the force, it will be seen that the wastage was practically 100 per cent. This wastage was all dead wastage with the exception of approximately 444 horses, 80 mules, and 329 donkeys, cast and sold during the campaign.

As there is no parallel instance for such a colossal wastage of animals in any campaign, the causes that led to it and the efforts made to prevent or lessen it are worthy of more than passing notice on the part of veterinary science. As the campaign lasted for four years and the wastage varied in its different phases, it will lead to a clearer appreciation if the four years are divided into three periods and considered separately:—

- (1) From August, 1914, to March, 1916.
- (2) From March, 1916, to January, 1917.
- (3) From January, 1917, to the end of the campaign.

First period, August, 1914, to March, 1916. The wastage during this period was far the smallest and, indeed, could not be considered abnormal for an African campaign. The total number of animals dealt with was approximately 20,000. The veterinary organization of this period is described in a later section (see page 421).

Second period, March, 1916, to January, 1917. This phase of the campaign was a veritable "chamber of horrors" in so far as animal life was concerned.

The sudden switching of the 1st South African Mounted Brigade from the healthy line of Longido, where all arrangements had been made by technical departments to cope with mounted troops, to the fly-infested country on the Voi-Taveta line, marked the beginning of the big losses. The Commander-in-Chief agreed that the losses would be heavy, but considered them justified if the period of the campaign could be shortened.

A table on page 425 shows the numbers of animals issued, by months, to the two divisions using mounted troops during 1916. A fact worthy of note during this period of the campaign

is that the commander-in-chief and general staff were not in intimate touch with the Veterinary Services. There was no veterinary staff officer in the field with general headquarters.

A survey of the incidents of the campaign fails to indicate how the technical departments concerned could have added to their efforts to improve the conditions under which the animals were used or to obviate any of the losses that occurred. The administrative staff were always miles away from the commander-in-chief and his chief of staff. Considering the enormous number of animal reinforcements that were being used—at one time approaching an expenditure of a quarter of a million sterling monthly—a speeding up of animal wastage returns from units in the field, for frequent submission to the commander-in-chief, might have had a beneficial effect. Combating disease was only half the battle. Bad animal management and starvation could be represented but were out of the power of the Veterinary Services to remedy.

With mounted troops and animal transport operating in fly-belts, the ultimate result of approximately 100 per cent. mortality could not have been avoided; but there is no doubt that, with proper management and food, the period of usefulness of the animals in the field could have been lengthened to such an extent that it is quite possible a saving of 50 per cent. would have been effected during 1916.

Third Period, January, 1917—end of Campaign. The incidence of disease did not differ from the preceding period.

Although the conditions under which the animals were used improved greatly subsequent to January, 1917, the following extract from the commander-in-chief's (General Hoskins) despatch for the period January to May, 1917, is of interest and importance to anyone studying the East African campaign from an animal point of view. It runs:—

“It will be realised that exceptionally heavy work was thrown on the veterinary corps. How great was the animal wastage has been shown in the monthly returns for the whole period under review; the mortality amongst horses, mules and donkeys was extremely heavy, mainly caused by trypanosomiasis and to a lesser extent by horse-sickness. Contributory causes were lack of food and heavy rains. The difficulties of transport made it impossible to carry grain for the number of animals on the various lines.”

Veterinary Services with Enemy Forces during the Campaign.

Very little was known of enemy veterinary personnel during the campaign. At certain places the capture of veterinary drugs and instruments went to prove that the enemy had an up-to-date veterinary service. Nothing was known with regard to its organization, however, until after the Armistice, when an interview with Ober Veterinaire Huber elicited the following items of interest.

When retreating before our forces, which was his plan of campaign from March, 1916, to the Armistice, the German commander-in-chief

kept his veterinary services employed in making veterinary surveys of the country in his rear, and based his line of retirement in accordance with the reports of his chief veterinary adviser, the route reported to be the most deadly to animal life being invariably chosen. If a desirable route from this point of view was impracticable for other reasons, a strong force of infantry was always sent to occupy the position considered to be most deadly for animals and remained there, if possible, until mounted troops were attracted to that area.

Looking back over the campaign, this strategy is, in many instances, abundantly evident, but nowhere so well marked as in the selection of the line of retirement from Korogwe to Morogoro. Practically every equine that went forward on this line died within three weeks, and a mounted brigade with its artillery and animal transport followed Von Lettow to Morogoro on this road—approximately 4,000 horses and mules. This was not the total death roll, however, as approximately 8,000 horses and mule reinforcements were sent along this road between August and October, 1916. The total loss in animal life caused by this move of the German commander-in-chief was therefore 12,000 horses and mules, representing a loss of half a million sterling.

Again, when the German force, greatly reduced in numbers and employing carriers against our animals, was being harassed by the K.A.R.M.I. in the southern part of Portuguese East Africa, the enemy broke west and then north, finishing his retreat round the northern corner of Lake Nyassa through fly-belts in which a rapid and malignant type of trypanosomiasis rendered pursuit by mounted troops impossible. He thus secured immunity from mounted pursuit at a most critical moment when the general officer in command of the offensive against him felt confident of terminating the campaign by a complete capture of the German force.

A further and more subtle example of how the German commander-in-chief brought his veterinary services into play as a weapon of modern warfare was the traversing with a mob of cattle from non-enzootic areas the actively immunised belt north of Lake Nyassa, where Mr. Gray (Principal Veterinary Officer, Union of South Africa) and his assistants had laboured so strenuously and long to prevent the spread of the dreaded scourge of rinderpest to the farms in the Union of South Africa and Rhodesia.

Veterinary Services Personnel.

<i>Corps.</i>	<i>Officers.</i>		<i>Qmr.</i>	<i>Other Ranks.</i>
	<i>Veterinary.</i>	<i>Entomological.</i>	<i>Livestock.</i>	
A.V.C. ..	4	—	1	8
E.A.V.C. ..	18	2	15	107
S.A.V.C. ..	26	—	—	502
A.N.V.C. ..	—	—	—	104
	—	—	—	—
	48	2	16	721
	—	—	—	—

These numbers do not include unskilled native personnel, numbering thousands.

The wastage in personnel was approximately 25 per cent. of the strength per annum. The personnel remaining at the end of the campaign were nearly all between the ages of 35–45 years. The older men generally stood the climate better than the younger, who suffered to a greater extent from malaria and dysentery.

The E.A.V.C. took the field in August, 1914.

The A.V.C. " " " " " 1915.

The S.A.V.C. " " " " " 1915.

The A.N.V.C. " " " " " 1917.

Most members of the A.V.C. had served in France, and most of the S.A.V.C. in the South African rebellion and German South-west African campaign.

The E.A.V.C. furnished the D.D.V.S. and all the administrative officers except one A.D.V.S.

Stationary veterinary hospitals were formed at the following places during the campaign :—

<i>British East Africa.</i>	<i>German East Africa.</i>	<i>Portuguese East Africa.</i>
Nairobi.	Tanga.	Port Amelia.
Kadjiado.	Korogwe.	Balama.
Kilindini.	Handeni.	Mnapo.
Nakuru.	Summit.	Nampula.
Mashoti.	Morogoro.	
Mbuyuni.	Daroes-Salaam.	
	Dodoma.	
	Iringa.	
	Mpapua.	
	Kilwa.	
	Lindi (twice).	
	Mengozi.	

Mobile sections were four :—

Mobile Section A.

Mobile Section C.

Mobile Section B.

Mobile Section D.

The pathological laboratory with its staff at Nairobi was placed at the service of the army.

Protective sera and vaccines were manufactured and issued to units in the field. Amongst these were rinderpest serum, anthrax vaccine, and preiz-nocad bacillus vaccine for ulcerative lymphangitis. These agents were used chiefly by the livestock department engaged in supplying slaughter cattle for the troops. A travelling laboratory was at one time sent into the field, but transport difficulties necessitated its withdrawal.

Each regimental veterinary officer was equipped with a veterinary section composed of one serjeant, two corporals, one shoeing-smith. His equipment comprised two pack mules, carrying four veterinary chests; seven horses, including two for himself and one for his servant. The shoeing-smith proved to be a most useful man in

bush country, as the number of staked feet due to amateur road-making kept him fully employed.

Veterinary Organization, August, 1914, to March, 1916.

At the outset of war there was no military veterinary organization in the East Africa Protectorate, but there existed a civil veterinary department consisting of fourteen officers of the colonial service.

In order to meet the urgent and suddenly created military demand for veterinary assistance, the civil veterinary department was at once turned into a military organization and given the title of the East African Veterinary Corps. It had a strength of fifteen officers, three Indian assistants, a number of stock inspectors, clerks, quarantine hands, etc., and was commanded by the chief veterinary officer* with the title of Director of Veterinary Services and Remounts and the temporary rank of lieutenant-colonel. Two senior officers were given the temporary rank of major; the remaining officers were granted the temporary rank of captain. The subordinate staff was treated in a similar manner with non-commissioned ranks. Qualified Indian assistants were granted the temporary rank of jemadar.

The first urgent necessity was to buy animals and, as a preliminary measure, the officer commanding the forces entrusted all animal purchasing to the E.A.V.C. Purchasing was commenced and large demands for horses, mules, donkeys, transport oxen, slaughter cattle, sheep and goats, were at once made by the various hastily formed regiments and technical units.

Veterinary sanitary and preventive measures, which were destined to play such a large and useful part in the campaign, were at once instituted by the Director of Veterinary Services and Remounts. A set of regulations, embracing advice on the prevention of disease and the recognition and treatment of the more common ailments, was prepared for circulation amongst the units of the force.

The organization required to enable one department to carry out the multifarious duties demanded of it would at first glance present insuperable difficulties. Such was not the case, however, as all obstacles to the smooth and efficient working of every branch were swept aside by unity of control.

Before the subject of organization is further dealt with it should be said that an Indian Expeditionary Force arrived in October, 1914. The general officer commanding this force assumed supreme command in East Africa. The duties of the E.A.V.C. were reviewed and confirmed. Arrangements were then made to meet the very much larger demands that would be made in view of the operations shortly to commence, which necessitated expansion of the E.A.V.C. to a much bigger department. Lay officers were taken on, and big additions to non-commissioned and other ranks were made.

To arrive at a correct sense of proportion, it is necessary to examine in detail the initial organization and the work carried out by the E.A.V.C. in its various branches.

* Colonel R. J. Stordy.

Purchase of Animals.

This duty involved three distinct sections :—

- (a) Purchase of remounts, including horses, mules, donkeys and trek-oxen.
- (b) Purchase of slaughter stock, including cattle, sheep and goats.
- (c) Veterinary administration.

Two centres for the purchase of remounts were established, with a veterinary officer in charge of each. Before any technical units were available, it was necessary for the officer-in-charge to carry out the work of depot construction, the purchase and transport of grain, fodder and equipment, and the recruitment of labour ; all of these duties had to keep pace with the purchasing, accommodating and issuing of remounts.

Before the end of September, approximately two thousand animals had been purchased, handled, classified and issued, or held ready for issue, by these two remount depots, each in charge of a single veterinary officer.

The technical veterinary duties in connection with this work are so closely interwoven with the necessary routine that the officer-in-charge experienced very little more exertion than if he had been associated with a remount officer. For example :—

- (i) A veterinary officer purchasing remounts forms his opinion as to the animal's suitability and soundness at the same time.
- (ii) In depot management, an officer acting in the dual capacity of depot commander and veterinary officer is a great economy in all ranks, without any loss of efficiency and with the added benefit of work more expeditiously carried out.

Known as the Livestock Branch of the E.A.V.C. the organization necessary to cope with the increasing size of the expeditionary force soon assumed large proportions.

The wide areas over which stock had to be purchased and the constant presence of cattle epizootics involving immunization work on a large scale, all tended to make the burden of this work a very heavy one.

It requires a knowledge of African stock diseases to enable one to appreciate the work in connection with the concentration of thousands of stock weekly and to avoid serious losses from disease. Practically every beast issued had at one time or another been protected by one or all of the various vaccines and sera manufactured by the laboratory branch of the E.A.V.C.

In this section also unity of control was the great determining factor in the success gained. The purchasing organization, the manufacture of vaccines, etc., the control of movement, the selection of routes, and final issue, were all in the hands of the Director of Veterinary Services and Remounts. Side by side with the bringing

into working order of the organization already described, the work of supplying veterinary assistance and drugs to units preparing to take the field and arranging for their maintenance in the field was carried out. The greatest economy was exercised in the grouping of units in order to make the small number of veterinary officers suffice.

To bring the entire work of the E.A.V.C. on to one canvas it is necessary to refer to the all-important task of the Director of Veterinary Services and Remounts and his staff in assisting the general staff to determine the lines of advance of the expeditionary force from an animal point of view. The unsuitability of many parts of East Africa for animals was keenly appreciated by the general officer commanding and by the general staff, who consequently kept in close touch with the Director of Veterinary Services and Remounts on all matters where movements of animals were concerned. The Director of Veterinary Services and Remounts, or his representative, was invariably present at staff conferences where such matters were discussed during the period 1914-15. The health of the animals of any column at all times depended completely on the advice given in the selection of routes, and the responsibility was consequently very great.

Veterinary sanitation was able to assist largely in overcoming difficulties in many ways. Ox transport was depended on largely; yet there was no line of advance that could be called safe for cattle, and the probability of a force being cut off from its base by a failure of its transport had to be faced. This difficulty was overcome by the selection of cattle immune to the particular disease which had to be faced and the immunization of reinforcements. As this affected slaughter cattle going forward, as well as trek-oxen, the success of a movement could, and, frequently did, depend on the advice and assistance of the veterinary staff.

The administration outlined above continued up to the end of 1915, and the number of animals on the strength of the force during that period was approximately 20,000. This figure did not include slaughter animals, which were issued to the troops at the rate of 3,000 oxen and 15,000 sheep a month. Of the 20,000 animals used during the period August, 1914, to January, 1916, the mortality did not approximate to 10 per cent. monthly.

At this stage of a review of the campaign it is necessary to keep in mind the total strength in veterinary officers of the services responsible for the work performed.

Reference is made to the size of the staff at this stage, as it will be readily seen that when it was decided to increase the expeditionary force by what amounted to two divisions, expansion on a very large scale was required if the work of the three branches (Veterinary, Remounts and Livestock) of the East African Veterinary Corps was to be continued.

The Director of Veterinary Services and Remounts decided, however, that in view of the increased work with veterinary services

and remounts it was no longer possible to carry on the work of the live-stock section, and asked to be relieved of that duty. He suggested that the section be placed under the deputy director of supplies and transport, pointing out that all arrangements had been made for the supply of livestock for at least six months ahead, but that the work of collecting had increased very much. This happened at the end of 1915. All the energies of the veterinary corps were now directed to the work of veterinary and remount matters only.

Early in 1916, the remount department at the War Office sent out an assistant director of remounts with instructions to take over the remount service. This was accordingly carried out. The veterinary department then entered on what may be described as the second phase of the campaign, shorn of what had been two most successfully conducted branches. The new head of the remount service claimed for duty with him one of the veterinary officers, who subsequently succeeded him when he was transferred from East Africa ten months later. The two services were not destined to remain apart as they were re-amalgamated later on by the commander-in-chief.

It has been shown elsewhere that executive assistance was re-obtained for the purchase of live-stock, so that, although the livestock purchasing branch did not again pass into veterinary control, it is interesting to note that the veterinary services finished the war as they began, i.e., intimately associated with their original three activities, "remounts," "live-stock" and "veterinary."

The Abyssinian Horse and Mule.

No report on the East African campaign would be complete without a short description of the indigenous horse of Abyssinia, which is used extensively in Kenya Colony.

A constant trade is carried on by Abyssinians, Somalis and Arabs between Abyssinia and East Africa, approximately two thousand horses and mules being brought down overland annually. The price in Abyssinia represents about £5, and the animals sell for prices varying from £10 to £30 in East Africa.

A good specimen of the Abyssinian is a true pony of the light riding type, standing 13 to 14 hands high. In colour grey predominates, then follow bays, browns, chestnuts, and blacks, in the order mentioned.

Bred in the highlands of Abyssinia, and worked from an early age, these ponies possess a wonderful power of endurance. Their capacity for work under war conditions, when rations were often scarce, made them very popular with the East African Expeditionary Force. The numbers used by the force were under a thousand. Representations were made to the War Office for permission to buy in Abyssinia, but without success.

The Abyssinian mule is a small animal averaging about 12·2 hands high, and possessing striking powers of endurance combined with speed. As pack mules for hilly country or harness mules for

Horses and Mules issued to 2nd and 3rd Divisions.

1916.

	January.	February.	March.	April.	May.	June.	July.	August.	September	October.
	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
2nd Division	1,641 290	717 215	903 33	402 333	411 628	416 1,168	1,695 530	1,428 938	500 —	2,542 893
3rd Division	—	—	—	—	1,360 446	729 83	806 348	1,005 338	1,020 494	143 200

Total 2nd Division—January to October, 1916 .. 15,683 Horses and Mules.

Total 3rd Division—May to October, 1916 .. 6,972 Horses and Mules.

light draught, they have few equals. They are easily broken to saddle, and are capable of carrying a trooper with his full equipment great distances at about 4 miles an hour without showing fatigue. The 5th K.A.R. at present in Kenya Colony have one mounted infantry company mounted on these mules.

It is not known for certain, but it would appear that the highlands of Abyssinia are free from the dreaded scourge of African horse-sickness. The experience of travellers who have reported their experiences in this connection shows that horses cannot be used with safety on the plains to the south of that country.

South African Veterinary Corps.

The important part played by the South African Veterinary Corps in the East African campaign cannot be dealt with separately from the veterinary operations of that theatre of war, but the following extract from a report by the Director of Veterinary Services of the Union Defence Forces will help to show how considerable the assistance was :—

“ Animals were now (August, 1915) being selected for service in German East Africa, and all mules for the Nyassaland Mountain Battery and for the South African Field Artillery were undergoing immunization by the South African Veterinary Corps against horse-sickness.

“ Instructions were received to form the following veterinary units for service in East Africa :—

2 Base veterinary hospitals and stores.

1 Base veterinary store.

1 Advance base veterinary hospital.

3 Mobile veterinary sections.

Veterinary officers and details to supply 4 mounted units in the field.

Details for ox transport.

Veterinary officer and details for South African Field Artillery.

Veterinary officer for mountain battery, Nyassaland.

“ All the foregoing requirements were duly met, and the following appointments and enlistments made :—

13 Veterinary officers.

262 Other ranks.

83 Natives.

“ All nominal rolls, attestation papers, etc., were completed and forwarded to the record office and the paymaster.

“ In addition to the above, 384 mules were immunized for units proceeding to East Africa. 11,000 doses of mallein, 2,100 doses of horse-sickness serum and virus, and 24 veterinary pack panniers complete with drugs and instruments were forwarded to Kilindini.

" All horses and mules forwarded were carefully examined and mallein tested prior to departure from the various depots, and again at Durban, the port of embarkation. During the period covered by this report the number tested was approximately 20,000 animals.

" All animal ships were provided with veterinary details and veterinary stores for the journey.

" The following depots were opened for the requirements of the East African forces :—

Roberts Heights, Pretoria.

Fort Napier (near Maritzberg).

Durban."

CHAPTER XVIII.

THE VETERINARY SERVICES IN SOUTH PERSIA.

AN A.D.V.S. was included in the establishment of the South Persia Rifles when this force was organised in the early months of 1917. This officer was provided from the already greatly over-depleted veterinary staff which at that time was struggling to carry on the veterinary duties in India, and maintain the veterinary establishments of the overseas veterinary contingents and more especially those of the army in Mesopotamia. He left India for Bandar Abbas early in March, taking with him the equipment of an Indian field veterinary section and a small supply of veterinary stores. He was given instructions to draw up a scheme for the organization of any establishments necessary to carry out the veterinary duties in the new force after he had gone into the whole question on the spot. On arriving at Bandar Abbas he found that the 2nd echelon, which he was to have accompanied to Shiraz, had already left. He at once set out to overtake this column, which he found at Saadatabad on March 12th, and proceeded with it to Shiraz.

The outstanding features of the march from a veterinary point of view were the number of cases of foot lameness in the transport mules, the extensive galls from the pack saddlery and "palans" in the mules and camels. The mules belonged to the 47th Mule Corps, and they were very small, undersized and of bad physique. These animals were not shod, and as the going was very hard and stony, and the marches long and arduous, they suffered exceedingly from bruised feet and laminitis, and a good many had to be left behind at the various stages en route.

The local transport animals, viz., mules and donkeys, are all shod with the special shoe of the country; and there is little doubt that, had the 47th Mule Corps been similarly shod, there would have been nothing like so great a percentage of foot trouble as there was. It is most advisable that all mules sent to Persia should be shod before being sent up country, preferably with the local shoe, though the Indian pattern shoe would be better than nothing.

The mules were fitted with the "Olley-Quinn" equipment, which was many sizes too big for them. In consequence, the loads were carried too low and caused excessive rib pressure. As the cruppers and breechings were too big, the saddles tended to gravitate forward, and this, coupled with wide saddle arches, resulted both in pinching the sides and pressing the tops of the withers, giving rise to serious trouble. It was, however, possible to work the animals almost immediately by shortening the breeching and cruppers, which kept the saddle well back off the withers. The rib injuries were obviated by placing a blanket or jhool under the panels. This lifted the arch of the saddle, and raised the load higher with less pressure on the bare ribs and more on the longissimus dorsi muscle.

In the camels the galls were due mainly to the palans, which were of inferior manufacture, and very quickly came to pieces when subjected to the long "treks" and rough usage of this country. As regards pack saddlery, there is little doubt that the Persian pack saddle is superior to the Indian pattern, at any rate for this country where the treks are long and arduous. The Persian saddle appears somewhat huge and cumbrous, but it distributes the weight over a much larger surface than the Indian pattern. In the hands of the "charvadar," or Persian muleteer, these saddles do excellently.

On arrival in Shiraz on April 18th, 1917, it was found that the veterinary service was represented solely by Temporary Jamadar Abbas Khan, 1st grade veterinary assistant. There was no veterinary hospital except a small very dirty and dark stable in the infantry barracks, which was a relic of the Swedish regime. This was quite unsuitable for a hospital and, after the inspection of several sites, a suitable, centrally situated place was found. This place had formerly been the stables of H.H. Prince Farman Farma, Governor of Fars, and, after repairs and alterations had been effected, it was opened as a veterinary hospital and turned out to be most suitable. There was inside accommodation for sixty-nine animals, including sixteen roomy loose boxes, two colic boxes, a roomy forge, etc., and outside accommodation for sixty-two animals; in addition, there was an adjoining isolation stable. There was a good well of sweet water in the compound, which was a great boon.

In the scheme submitted to army headquarters as a basis for the veterinary services of the South Persia Rifles, provision was made for the establishment of first class veterinary hospitals at Shiraz and Kirman, with a veterinary officer and a field veterinary section at each place. The establishment of each hospital was as follows :—

Fars and Kirman Brigades.

Station Veterinary Hospital (including a Field Veterinary Section).

Detail.	British.		Persian.			Total.	Horses
	B.O.	N.C.O.	P.O.	N.C.O.	R. & F.		
Brigade Veterinary Officer	1	—	—	—	—	1	2
Serjeant-farrier	—	1	—	—	—	1	1
Shoeing-smith	—	1	—	—	—	1	1
Persian Veterinary Officer,							
Naib 1	—	—	1	—	—	1	1
Mirza, Aspirant 1	—	—	1	—	—	1	—
Tabin (Groom), sar-i-Jugi	—	—	—	1	—	1	—
Tabins (Grooms)	—	—	—	—	23	23	—
Special enlistments	—	—	—	—	(a)2	(a)2	—
Batmen	—	—	—	—	(b)5	(b)5	—
Totals	1	2	2	1	30	36	5

1 Station Veterinary Hospital at Shiraz.

1 Station Veterinary Hospital at Kirman.

(a) 1 Water duties and 1 Conservancy establishment.

(b) 1 for each European and 1 for each Persian officer.

These establishments were based somewhat on the lines of a veterinary hospital in India with the exception that there was a larger number of permanent "syces" or grooms. This was due to the fact that there is no recognized "syce" class in Persia, and that the various mounted troops have no regimental syces on their establishment. The Indian practice of sending one syce for every two horses to hospital was therefore not feasible.

The veterinary officer at Shiraz, in addition to acting as brigade veterinary officer, had to carry out the administrative duties on the headquarters staff, South Persia Rifles.

On mobilization, the personnel of a mobile veterinary section would be obtained from the hospital establishment.

As regards the Fars brigade, the establishment was soon completed, with the exception of the farrier-serjeant who did not arrive until December 11th, 1917. He reached Bandar Abbas at the same time as an executive veterinary officer, who arrived with a farrier-serjeant and a field veterinary section for Kirman.

At Shiraz the place of the farrier was ably filled by Jemadar Abbas Khan, mentioned above. He did excellent work in recruiting and training the Persian personnel who had to be recruited from the labouring class and trained as grooms, no light task considering the dislike shown by them for work of any description. Their idea of grooming is to stand the animal up to its hocks or belly in a "jube" (stream) of water and splash water perfunctorily over its body. After a few minutes of this treatment the animal is led away, but no attempt is made to dry the animal, which is usually then placed in a dark badly ventilated stable with "dry" dung as bedding. Straw or other material is not available in abundance, but the little there is is dried and beaten out in the sun and used as bedding. There is no attempt at drainage, and the animals' heels are almost always wet, consequently "cracked heels" were very prevalent. In the South Persia Rifles, after washing was prohibited and the drying of heels after watering, etc., ordered, the number of cases of cracked heels largely diminished.

As the shoeing arrangements in Shiraz were far from satisfactory, and there were no British farriers, a central forge was fitted up in the veterinary hospital. Nalbands were trained here for the various mounted units, which thus obtained their full complement of nalbands and were then able to do their own shoeing regimentally. The shoeing of the staff, details, etc., and also of the horses of the British instructors, was done at the central forge.

The nalbands were instructed in the anatomy and physiology of the foot, and the senior nalbands received first aid and elementary veterinary instruction.

On the day the A.D.V.S. arrived, a mule was submitted for inspection which had suddenly become sick. It belonged to the 1st Battery Artillery, South Persia Rifles, and was showing the symptoms of glanders usually seen in mules—an acute ulcerative catarrh. It was destroyed, and a post-mortem examination revealed

extensive ulceration of both sides of the septum nasi. Mallein was wired for from India, and in the interval prior to its arrival three clinical cases of glanders occurred. The dark, badly ventilated, undrained, damp Persian stables constituted an ideal "habitat" for the glanders bacillus.

Galls were very prevalent among the horses, a good many being of enormous extent. This was largely due to the total lack of horsemanship on the part of the sowars who, unless carefully watched, would sit in the saddle the whole day without dismounting, and would never loosen the girths. The Persian thinks it undignified to walk, and will not voluntarily do so. The consequence is that on long journeys he will never dismount except in case of necessity; the saddle is thus glued to the back for very long periods, and galls result from the continuous dead pressure. Another reason for galls amongst the riding animals of the South Persia Rifles was the fact that the saddles were originally issued without numnah-panels, and were fitted with a blanket only. The saddles were thus as a rule too big for the so-called Persian horse, which is only a pony according to western ideas. The absence of panels left too wide an arch, which allowed the saddles to settle down on to the top of the withers and on to the back midway between the pommel and cantle, so that extensive galling resulted. Ultimately numnah-panels were fitted to the saddles, and a great reduction in the number and extent of the galls resulted. These galls showed very little tendency to develop into fistula, etc., unless the aggravation was continuous and prolonged. All wounds healed up extraordinarily quickly in the Fars brigade, and required practically nothing but a little common salt solution as a dressing.

Contagious Diseases.

Glanders, sarcoptic mange, and fever (probably piroplasmosis) were met with.

Glanders. There is little doubt that glanders is very prevalent in this country. It is well recognized as a contagious disease and animals with clinical symptoms are usually got rid of, but, as in all Mohammadan countries there is a marked aversion to taking life, glandered animals are either given away or turned loose to roam about and spread the disease.

As regards the horse, the chronic type of glanders was not encountered. The usual type was of the nature of acute farcy, numerous buds appearing in various parts of the body. Only one case of the acute catarrhal type, with swelling of both submaxillary glands and ulceration of both sides of the septum nasi, was seen. In mules the disease was of the type usually seen in these animals, viz., an acute bilateral catarrh with extensive diffuse ulceration of the septum nasi.

The reaction to mallein appeared to be more delayed than in other countries. It was quite common for practically no swelling to have appeared at the twenty-fourth hour, and subsequently

there would be an enormous typical local reaction which took several days to develop fully. There was almost invariably marked "cording." The reactions were thus of slower incidence but of longer duration than those which had been customary. A somewhat acute outbreak of glanders occurred in Kirman.

Mange. Mange was also a prevalent disease, and little or no notice was taken of it. Considering its prevalence in horses, mules and camels in civil life, it is a matter for congratulation that there were not more cases in the South Persia Rifles. The prevailing type was of the sarcoptic variety.

Fever. During the summer months there was an outbreak of fever, mostly in the cavalry lines. With the exception of the absence of marked biliary symptoms, clinically the disease resembled piroplasmosis as met with in India and South Africa. There was high fever, marked prostration and loss of appetite, with rapid loss of condition. A good many smears were examined microscopically but, owing to the inability to obtain alcohol of good quality and to the fact that the tabloid stains were very old, the staining was not satisfactory, and nothing definite could be made out. In two cases there were intra-corpuscular bodies, with a red chromatin spot somewhat resembling the piroplasm of biliary fever, and it seems probable that the disease was a piroplasmosis. In favour of this was the fact that the intravenous injection of quinine, according to the Williams' method, was practically a specific. In only two cases did this fail to effect a cure, and both these animals were in a critical condition prior to the administration of the quinine. They had both come off a long march, one being a "Waler" pony which had marched up from Bandar Abbas in the middle of the hot weather and was admitted in a semi-comatose state to hospital on the day of its arrival; the other being a "Turkomani" which had marched in from Teheran. In both cases the disease was too far advanced for the treatment to be of any avail. But there is little doubt that, administered within a day or two of the onset of symptoms, the quinine treatment is a specific.

Against the theory of the disease being piroplasmosis is the fact that when the stables of cavalry units in which the many cases were occurring were evacuated and the animals were picketed out in the yard of the caravanserai, the disease stopped immediately, there being not a single case afterwards in these units. It was assumed that the disease was transmitted by mosquitoes.

A few cases of ringworm, strangles and catarrh occurred.

Sanitation.

The question of dealing with contagious disease in this country is a difficult one. There is no Contagious Diseases Act, and no measures are adopted which come under the heading of "Sanitary Police." Sanitation is unknown, and though a disease is recognized to be contagious and a danger to the community, no attempt is made to suppress an outbreak. Animals are only destroyed for

food. The consequence is that animals suffering from contagious disease are to be seen walking and roaming about without any restriction. Disease such as glanders and mange are consequently very prevalent.

The serais throughout the country were in a filthy condition. They were all dark, damp, and had the minimum amount of ventilation, and were thus ideal for the growth of germs. Under the system of convoys and posts for serais, this condition constituted a public danger. As these serais were open to the public, and it was not politic to attempt any restrictive legislation regarding the use of them, it would appear that the only effectual solution of the difficulty would have been the erection of serais for the sole use of the South Persia Rifles. Again, both in Shiraz and Kirman, the stables of the various mounted units and also the veterinary hospitals were situated practically in the bazaar, there being no other site available. Further, all animals, military and civil, were watered from "jubes" (running streams of water), which were exposed to every kind of surface infection.

Parasites.

Post-mortems were made on most of the animals that died or were destroyed, with a view to discovering parasites. The only two parasites that were met with were stomach "bots" (which were very common), and ascarides which were only found in a few instances. No other internal parasite was observed. This is probably due to the dry climate not favouring the hatching out of "ova."

Colic.

The staple food for horses in this country is barley, which is usually given whole and not crushed. The Persians often soak the grain for hours, producing a moist and often fermented state. This is the usual cause of colic in this country. After this practice had been stopped in the South Persia Rifles there was very little colic among the animals of this force. It was found unnecessary to prepare barley in any way, such as by boiling, crushing, or parching. The grain was given whole, preferably mixed with bhoosa, except in the case of delicate feeders, when the grain was crushed.

Soundness.

The Persian horse appeared on the whole to be fairly sound. A good many were small, narrow, "tied in at the elbow," with chumpy shoulders and small lumpy hocks, thus exhibiting the faults of the Arab, a breed which largely predominates in Persia. There appeared to be very little bone trouble, such as splint, ring-bone, sidebone or spavin, the majority of the cases of lameness being due to accidents, bruises and defective shoeing. Cataracts were common; and several cases of "broken wind" were seen, but no case of roaring or whistling. A good proportion had bad shoulder action with consequent excessive knee action, and were therefore deficient in speed.

Castration.

One hundred and thirty-eight horses were castrated in the Fars brigade. There is a prejudice against castration in this country, hence the majority of the horses are "entire." Quite a number of these stallions in the South Persia Rifles became very vicious, giving the maximum amount of trouble on every occasion, and many injuries were due to these animals fighting. They were very noisy and difficult to restrain when dismounted, and therefore likely to be a source of danger in military operations, particularly at night. A good number were also addicted to "self-abuse," with consequent loss of condition.

Castration had excellent results, both as regards temperament and condition. Owing to military operations, castration had to be discontinued, but as a matter of military policy it was considered that only the very old animals should be left entire.

The basis of the scheme for the organization of the veterinary services has been stated above. The scheme was ultimately completed as regards the Fars brigade and, with the exception of the hospital treatment, also for Kirman where a veterinary hospital was built.

It was understood that extraordinary difficulty had been, and was still being, experienced by the army veterinary services in India to meet demands in other and much larger spheres of operations, and that demands for veterinary personnel and material for South Persia should be fixed as low as possible. The scheme was thus fixed as the minimum required for the commencement of the veterinary services of the South Persia Rifles.

During the last year a change occurred in the policy of the South Persia Rifles. Formerly the policy was to split up the troops into innumerable small bodies along the various lines of communication or roads. This was changed, and the troops were assembled in strengths of not less than one squadron. In these circumstances the employment of more veterinary assistants was considered advisable, and more were asked for but they were not available.

It was impracticable to train Persians as veterinary assistants, and consequently, as far as possible, the far more efficient Indian veterinary assistant was employed. In the event of its being desired at any future time to employ the Persian in this capacity, it is suggested that selected men be sent to a veterinary college in India to undergo a thorough course of training.

A Note on the Persian Method of Shoeing.

This note was compiled after a twelve months' sojourn in the country, during which period the methods and results of the Persian system were noted and compared with the "regulation" method. It is well known that in many instances eastern methods stand out in marked contra-distinction to western methods, and in nothing is this better exemplified than in shoeing. In the west the plan

usually followed is to fit the shoe to the foot, whereas in Persia the opposite is the case, the foot being fitted to the shoe, or rather fixed to the shoe, as there is very little fitting in the western sense of the word. This is due to the fact that the shoes are made by professional horse-shoe makers, who are solely concerned in the making of the shoe and punching the nail holes, and have no standard sizes.

The shoes are made in various sizes according to the discrimination of the makers, and there is no pretence of making special shoes for each animal. After completion the shoes are disposed of to various nalbands, who fix the shoes on to the animals of their respective clients. Thus, instead of the shoe being fashioned and fitted in a single farrier establishment, the Persian shoe is first made by the maker, who disposes of it to the nalband. The Persian nalband cannot make a shoe, nor can he alter it after it has been made.

Shoes are sold by the weight—so much a “man” (a Persian standard of weight), the price being dependent on the price of iron, which fluctuates like other commodities. The nalband obtains so much for shoeing each horse; and it is evident that the more shoes he obtains per “man” from the makers, the more he stands to gain. He will thus try to obtain a light flimsy shoe in preference to one of a more solid pattern. He thus benefits in two ways, as he gets more shoes and the shoes wear out more quickly.

The shoes vary in pattern according to the different localities. The two common patterns are:—

(a) Shiraz pattern, mostly seen in Fars.

(b) Ispahan pattern, usually seen round Ispahan, Teheran, etc.

The patterns are modified according to the nature of the country, the Shiraz or Fars pattern being used in the hard, stony country met with in the Fars province, whereas the Ispahan pattern is used in parts of the country where the “going” is much softer.

The experience on which these observations are based was obtained in the Fars area, and is consequently largely limited to the Shiraz pattern, though experiments have been made with the other pattern; but except when stated the subsequent remarks refer to the Shiraz pattern.

Compared with a regulation shoe, it is very much wider in the web and much thinner, and it is so shaped that the heels usually touch one another. In many cases a complete ring is formed, but this depends entirely on the whim of the maker. There is thus no space for the frog, but the whole foot is enclosed in an iron ring or plate with a hole in about the centre. The whole surface of the foot is therefore practically covered up by the shoe, and thus the maximum amount of cover is obtained—a valuable asset considering the hard and stony going. The shoe at the toe is about two inches broad, tapering gradually to about one inch at the heel. It is about one-eighth inch in thickness, being slightly thinner at the heel and has a distinct rock. Thus, compared with the regulation shoe, the Persian shoe is very much wider and very much thinner, though, as regards weight, there is very little difference.

The nail holes are made with a circular punch, being punched when the shoe is cold, and are much bigger and coarser punched than on the regulation shoe. There is no clip.

There is no regular periodical system of shoeing; the practice is to let the shoes stay on till they drop off, and only then is the animal re-shod. It thus frequently happens that animals are not re-shod for two and three months, and their feet are of abnormal length in consequence. To take down such feet with a rasp would entail considerable labour and time, but, with the Persian hoof-knife, this is quickly accomplished. The rasp is not used by the Persian nalband for levelling the foot, but simply for rasping down the clenches.

The nail is clenched somewhat in the western fashion on the inside of the foot only. On the outside, the end of the nail is twisted round several times and left as a prominent projection on the hoof. In the removal of the shoe the pincers are the only instrument used. The nails are thicker in the shaft than the regulation nail, and have enormous rose-heads. The heads project very much beyond the level of the shoe, and assist in giving a good grip over rocky ground. The large head also prolongs the wear of the shoe, and without it the thin shoe could not be retained on the foot.

The wall of the Persian horse's foot is abnormally thick when compared with that of other breeds. This may be due to a process of evolution, as, in addition to the thick nails and coarse nailing, the shoes are invariably put on too small, a procedure which accentuates the coarse nailing.

If the Persian system were adopted on English, Colonial or Indian "country-bred" horses, there would be practically 100 per cent. of "pricks" or "presses." As the Persian horse has been subjected to this method for centuries, nature has probably evolved this extra thickness of the wall to obviate the risk of pricks. When experimental tests were being carried out it was found that the Persian nail could not be used on a number of Waler and similar horses as, owing to its thickness, it caused the splitting of the hoof, and there was great risk of pricking, etc. The use of Persian nails in other than indigenous animals was therefore discontinued.

The shoe is fitted cold. The nalband selects from his collection the shoes which are nearest to a fit, but he does not scruple to put on odd shoes; and the shoes are invariably much smaller than the foot in circumference, i.e. they are not shod flush with the wall. This is probably a good fault in the end, as a good many Persian animals, being narrow and "tied-in," are addicted to brushing, and if the shoe was flush with the wall very extensive brushing injuries would result.

First impressions of the shoe are most unfavourable, due mainly to its appearance and to the fact that the foot cannot be "picked out" and cleaned. To anyone imbued with western ideas of horsemastership the latter fact appears fatal, as it is assumed that thrush must be prevalent. However, the first essential for the onset of

thrush is atrophy of the frog due to lack of frog pressure. Owing to the Persian shoe being so very much thinner than the regulation shoe there is very much more frog pressure, and consequently less "atrophy of inaction" in the former and therefore less thrush. In appearance the shoe is badly fitting, the nail heads large and cumbersome, and the clenches unsightly.

From the above it might appear that there is very little good in the Persian method of shoeing, but this is not the case. In the main, the shoe is well suited to the country. In its breadth, coupled with its thinness, there is obtained the maximum amount of "cover" with the minimum of weight, and in these respects the shoe is difficult to improve on for this country, where the "going" is so hard and stony. The unsightly appearance of the nails is compensated by the grip they afford over rocky country.

Owing to the thinness of the shoe the frog is much nearer the ground than with the regulation pattern. The normal function of the frog thus receives more play with the Persian shoe, and consequently there is less atrophy of the frog with its attendant evils. Further, the anti-concussion mechanism of the frog is brought much more into play, and there is thus a good deal less lameness due to concussion.

Owing to the large amount of "cover," there is considerably less risk of bruising the feet on stony ground; also, there is no danger of picking up stones or nails.

As considerable prejudice against the Persian shoe existed from the inability to "pick-out" the foot—so essentially a part of military routine—a modified pattern was introduced for trial. This resembled the ordinary Persian shoe, with the exception that the heels did not meet but were open like the regulation shoe, and the frog was not covered. With the exception of the frog the remainder of the foot received "cover." The foot could thus be picked out and cleaned. This modified pattern gave good results. At first, owing to the frog not receiving cover as formerly, the animals were inclined to go short and "feel their feet," but the frog quickly became hard on the surface and there was no further trouble.

This modified pattern was also tried on Waler and Indian "country-breds," and gave excellent results. Quite a number of these horses suffered from the hard and stony going, due to the lack of "cover" when shod with shoes sent out from India. When shod with the modified or full Persian shoe which yields the maximum amount of "cover" they gave no further trouble. Their frogs also developed markedly.

The Indian shoe sent out here was the old-fashioned concave pattern which, being very thick and narrow in the web, gives the minimum of cover and frog pressure. The pattern has been obsolete for some years in the home service, and is entirely unsatisfactory. To satisfy certain criticisms, this shoe was tried on a number of Persian animals and invariably gave bad results. Animals that have been accustomed to the maximum amount of "cover" cannot be expected to go well when subjected to the minimum.

To sum up the advantages of the Persian shoe :—

- (a) It gives the maximum amount of cover with the minimum weight.
- (b) It gives as nearly as possible (particularly the modified pattern) normal frog pressure, which is never obtained with regulation shoes.
- (c) It wears well.

The disadvantages are :—

- (i) The foot cannot be picked out and cleaned. (This was remedied in the modified pattern).
- (ii) The nails are very coarse and are apt to split a thin wall.
- (iii) The shoes cannot be altered in the cold state, and when heated there is great tendency for the shoe to split or crack when being hammered, etc.

The modified pattern satisfied most critics. It required, however, more careful fitting than the full shoe, and owing to the scarcity of trained farriers it was not persevered with regimentally. It was used fairly extensively in the central forge in shoeing the animals of the staffs, details, etc., and gave good results. It can be recommended for adoption regimentally when full and properly trained personnel is available.

CHAPTER XIX.

THE VETERINARY SERVICES WITH THE NORTH RUSSIAN FORCE.

THE headquarters of the North Russian Force, known as the "Elope" force, distinct from the Murmansk (Syren) force, were located at Archangel, and operated on the following fronts :—

- | | |
|--------------|------------|
| (1) Cologda. | (3) Onega. |
| (2) Pinega. | (4) Dwina. |

An A.D.V.S. was appointed to the allied forces (British, French and American), and was technical adviser to the G.O.C.

The animals employed with this force consisted of cobs and mules imported from England, and Russian ponies.

The total numbers employed up to the evacuation of the force from Archangel in October, 1919, were :—

Russian ponies belonging to British troops	1,363
Cobs (British) imported	50
Mules (British) imported	771
„ (French) imported	90
Russian ponies belonging to Russians ..	1,502

Veterinary Staff.

This consisted of an A.D.V.S., eight veterinary officers and twenty-seven staff-serjeants. The duties were spread over a wide area.

Veterinary School and Hospital.

The Army Veterinary Corps was called upon to train Russian personnel in the duties of veterinary assistants—called "Velchers"—veterinary serjeants and shoeing-smiths, and also in the art of stable management.

A veterinary training school and veterinary hospital were opened at Archangel for this purpose, and also for the treatment of British and allied animals.

The school, a very nice house taken over by the military authorities, consisted of offices, class-rooms, dining rooms, officers' quarters, men's quarters and kitchen complete, and was under the command of a British veterinary officer and staff consisting of :—

- | | |
|---------------------------|-------------------------|
| 1 British staff-serjeant. | 3 Serjeants (Russian). |
| 2 Senior N.C.Os. | 2 Cooks. |
| 2 Labour men. | 2 Transport drivers. |
| 2 Orderlies. | 1 Civilian housekeeper. |
| 1 Interpreter. | |

It was considered necessary in the first place to train a Russian mobile veterinary section consisting of one Russian veterinary officer and twenty-five other ranks (all Russian) for duty at the front. The whole of this section was trained and equipped at the veterinary school.

Before proceeding to the front the mobile veterinary section was inspected by a Russian General Officer, and he expressed great satisfaction with the manner in which the section had been trained and turned out.

After the mobile veterinary section had left for the front, other Russian personnel were sent to the school for instruction as follows :—

- (1) To be trained as serjeants for veterinary duties.
- (2) To be trained as cold-shoers.
- (3) To assist in the work of the veterinary hospital, and learn stable management.

Lectures were given daily, and practical demonstrations were provided at the veterinary hospital.

A series of lectures had been translated into Russian, the school being fortunately in the possession of a Russian typewriting machine.

The translation of the lectures was a laborious and difficult task, chiefly on account of the great number of technical terms included.

All lectures were given at first through the medium of an interpreter ; at a later stage, by the aid of the Russian veterinary officer who was posted to the school for duty, they were given in Russian.

Experience showed that the best results accrued from slow and methodical work ; the average soldier who had been sent to the veterinary school was capable of learning and understanding only a few facts at a time ; the lectures had therefore to be very short and simple and not given too often ; otherwise the men got confused.

The duration of the course was from six weeks to two months.

The veterinary hospital, about 200 yards from the school, consisted of two large buildings and two smaller ones (for isolation cases), fitted up to hold about 100 animals, with modern electric light, a pharmacy, and small operating and dressing sheds.

The veterinary hospital was run in conjunction with the school, and all classes for demonstration were held at the hospital.

The veterinary school and hospital were, on the evacuation of the British troops from North Russia, handed over to the Russian authorities.

Veterinary Stores.

These were located at Archangel. A building was secured adjoining the office of the A.D.V.S., and the store was run in conjunction with his office. All veterinary instruments, drugs, etc., were supplied to the Russian veterinary service, and translations into Russian of the names of all the articles contained in officers' chests, officers' wallets, serjeants' wallets and veterinary unit chests were supplied to the Russian authorities.

In the early part of the campaign great difficulty was experienced in obtaining a requisite supply of veterinary stores on account of the White Sea being blocked with ice, which necessitated all stores being dumped at Murmansk. From Murmansk there was very

little opportunity of stores arriving at Archangel owing to the severe weather and to looting.

On the evacuation of North Russia orders were issued to pack up all veterinary equipment, priority being given to medicines, for transport to England. This was done with the exception of a small quantity of stores and chests, which were handed over to the North Russian veterinary authorities.

Veterinary Staff.

The whole of the veterinary staff was supplied by the British, except a few Russian veterinary officers, who were represented at the base by an officer of a rank equivalent to that of lieutenant-colonel in the British army.

Classes and Conditions of Animals.

The classes of animals employed with the British troops were Russian ponies, with mules and cobs imported from England. The Russian pony is a wonderful little animal, of a height varying from 12 to 13·2 hands. These were mostly grass-fed, and capable of consuming up to 36 lb. of hay per diem ; whenever a halt was called, a handful of grass was put in front of them, if only for a few minutes. The distance they are able to cover when drawing a sleigh is marvellous ; they are shabby, long coated and small. Every peasant is in possession of one or more.

Mules were all imported and were not satisfactory, especially when employed at the front as pack animals. During some of the small skirmishes at the river front the mules proved to be inferior to the local pony when it was necessary to get ammunition up to the firing line over rough and boggy country. The local pony would pick his way over the boggy ground, treading lightly and avoiding the soft spots. The mule on the other hand would, on coming on to the soft ground, flounder and struggle, with the consequence that he gradually sank into the bog, his pack had to be unloaded and he had to be dug out. In some instances it was useless to try to get him out of the bog, and he was destroyed where he lay. There were occasions in which small forces had to swim their animals across rivers, when it was again demonstrated that the Russian pony was far superior to the imported mule ; the Russian pony would take kindly to the water and would swim across, whereas the mule would cause the greatest trouble and possibly drown not only itself but its rider as well.

Cobs arrived from England later in the campaign and were only suitable for officers' chargers. There is no doubt that the only animal suitable for military operations in North Russia is the local pony.

The condition of the animals was, on the whole, satisfactory, but occasionally, owing to difficulty of transport, the oat ration for those in the forward areas ran short, and consequently they suffered in condition, especially the mules. Local ponies seemed to maintain their condition, which in some cases was excellent.

For a number of debilitated animals that had been sent down from the front areas an island at the mouth of the Dwina had been hired. Here the grazing was excellent and animals did well, the result being a great saving to the Government in the way of forage, as the charge for the hire of the island per head was very small.

Forage and feeding were on the whole good. As mentioned, there was at times a shortage of oats, but this was partly compensated for by the excellent grazing obtainable on the banks of the river.

The shoeing of animals of the British force was carried out with great difficulty, due to lack of staff and lack of tools and material. The shoeing of the peasant pony was of the crudest kind; any odd piece of iron fashioned into the semblance of a shoe and tacked on with a rough nail was all that was required. A great proportion of the peasant ponies remained unshod.

Infectious and Contagious Diseases.

All the animals of the force were malleined, and only one reacted to mallein. This animal was a peasant pony from the Mezzia district where glanders was supposed to be prevalent. Skin disease in the form of mange was very slight among the peasant ponies. The imported mules belonging to the French authorities suffered a bad outbreak of sarcoptic mange during the winter and, owing to climatic conditions, treatment was difficult. The outbreak was eventually stamped out.

Hvorst Poisoning.—A peculiar disease, supposed to be caused by animals eating the “mares tail” grass (*Equisetum Palustre*), appeared in the Archangel district in October, 1918. From enquiries made regarding the grass and its effects, it would appear that the condition of Hvorst poisoning was previously unknown in the Archangel district. Oats at this time were unobtainable, and grass was very scarce; 20 per cent. of the animals in the suburbs of Archangel died from a condition which was said to be due to “mares tail” poisoning. It may have been a “diet-deficiency” disease.

The symptoms were a gradually increasing paralysis, commencing with lack of co-ordination in the hind limbs, and ending with inability on the part of the animal to stand. The respiratory and digestive functions of the animal throughout the attack, up to the time of death, remained good. It was reported that grass away from the areas of Archangel did not appear to contain poisonous “mares tail”; in these areas the animals, although fed on the grass, were not affected. A plentiful supply of oats seemed to act as a preventive of the disease. Experiments were carried out in which an animal was fed on 30 lb. of “mares tail” in the green state per diem for a month and suffered no ill effect.

Anthrax in Reindeer.—Although no reindeer were employed with the Archangel force, it was understood that at different dates anthrax had almost annihilated reindeer in certain parts of North Russia.

The preparation of anthrax serum seemed to be the principal work carried out at the Russian veterinary laboratory at Archangel.

Communications.

The British line extended up the river Dwina from Archangel to Kultass, a distance of 331 miles. As there were no roads in North Russia, with the exception of what may be called cart tracks, the difficulty of carrying out military operations will be readily realized. The country abounds in thick forests and swamps, which render the area almost impassable.

Communications in winter are carried out by rail and by sleigh. Sleigh tracks are marked out, and are as a rule wide enough to take one sleigh. Any deviation from the track generally lands one in a deep drift. The Russian peasant ponies have an astonishing instinct for following these tracks. They are driven by word of mouth, and no bits are used. Imported animals would be useless for sleigh districts for want of knowledge of the sleigh tracks.

In the summer the railway and river are used, also to some extent the tracks already mentioned.

The map of North Russia shows that all the places of habitation are dotted along the railway routes and rivers.

In winter the transportation of troops, animals, food supplies and ammunition was carried out by rail and sleigh. In some instances ammunition was carried hundreds of miles by sleigh, a very laborious and tedious task. In summer, rail, river, sleigh tracks, and barges were used for purposes of transportation.

In summer, barges were used for conveyance up and down the river Dwina. These barges were fitted to hold 250 animals on the upper and lower decks. A journey up the river would often take as long as five days. At one time during operations the river was so low in parts that the greatest difficulty was experienced in supplying the troops and animals in the forward areas with their necessary requirements.

Climate.

Variations in climate are the outstanding physical feature of North Russia. The mean annual temperature of Archangel is 31° F., the mean maximum is 85° F., and the mean minimum is -31° F., the absolute minimum is -54° F. Ice sometimes appears in the White Sea in October, but not usually until November and December. No dependence can be placed upon open water after October 15th.

The White Sea never actually freezes, but together with the straits which connect it with the Arctic it becomes choked with ice forced in from the ocean. In the most favourable circumstances, the duration of navigation in the White Sea is six months (May to November) for sailing vessels, eight months for steam cargo vessels, and ten months for the ice-breaker type. The usual date for the breaking up of the ice in the Gulf of Archangel is mid-May, but the ice totally disappears in June.

Communication across the river around Archangel in summer is carried out by ferry boats, and in winter by a railway laid over the ice. The thaw sets in in May, and summer comes almost at once. In summer the daylight continues throughout the twenty-four hours, and in the coast region the sun does not set below the horizon in June and July. The weather becomes tropical, and the lightest summer clothing is substituted for Arctic kit.

Mosquitoes and flies abound in the summer, especially in the swampy districts. The soldiers in the front areas were specially equipped to withstand the often vicious attacks of these insects.

The black flies which breed in the running streams are abundant and pestiferous in June and July ; serious sores and large clots of blood often appeared in the region of the prepuce among the animals of the British force.

While in winter vegetation is non-existent, with the exception of moss (under the snow) which is the food of the reindeer, in summer it is most luxuriant on the banks of the rivers. On the islands around Archangel the grazing at this latter season was abundant, including all the well-known grasses and vetches. The transformation accompanying the change from winter to summer is remarkable. There is almost no cultivation of the soil in the northern part of the province of Archangel, where except for a few vegetables grown in the summer the population depends on food brought from the south.

Evacuation of the Force from North Russia.

On the evacuation of North Russia it was decided to trans-ship all the cobs and a great majority of the mules back to England. This was carried out in a highly satisfactory manner, and no casualties occurred.

During the period under review the casualties among the animals of the force from death, destruction and sickness were infinitesimal.

CHAPTER XX.

THE VETERINARY SERVICES WITH THE BRITISH MILITARY
MISSION IN SOUTH RUSSIA.

IN the early part of the year 1919, a British Military Mission, including representatives of the several technical arms of the British Army, was sent to South Russia.

The chief functions of the mission were :—

1. To dispose, to the best advantage, of the war material provided by the British Government for the armed forces of South Russia.
2. To give technical advice on the use of British army war material and other matters.

A due proportion of veterinary equipment and stores was included in the material provided from British sources : a summary of the issues made to the Russian authorities is given in Table "A."*

The establishment of the veterinary branch of the British Military Mission with the allied forces in South Russia in the earlier stages of its operations was :—

An Assistant Director of Veterinary Services (Lieut.-Colonel W. L. Harrison).

A Base Dépôt of Veterinary Stores, of which the officer in charge was Captain and Quartermaster R. Owen.

These two officers took the place of two appointed from the troops at Constantinople in anticipation of officers proceeding from home. This establishment was increased in September, 1919, by one executive officer (Captain J. B. Russell), one Quartermaster (Lieutenant J. J. F. Hynes) and six other ranks. When the mission left Novorossisk for the Crimea in March, 1920, the number of officers was reduced to the original establishment, and the number of other ranks to three serjeants.

The personnel and part of the material of the base depot of veterinary stores arrived in April, 1919, at Novorossisk, where the necessary accommodation was obtained in offices at the end of the large grain stores in the North Railway Station. This site gave facilities for the conveyance of stores by rail from the docks as well as for their despatch by rail from the depot.

In the course of unpacking the cases of veterinary stores that had arrived by sea, it was found that several had been broken into and the contents more or less rifled. After making all arrangements for the accommodation of the stores, the A.D.V.S. returned to the headquarters of the British Military Mission at Ekaterinodar, where he conferred with the chief of the veterinary service, armed forces of South Russia, on the subject of the existing veterinary organization of the forces. This appeared to be as follows :—

One general hospital for 500 patients at Oost-Labinskai.

One general hospital for 500 patients at Battaïsk.

* See page 449.

Certain infantry and cavalry divisional hospitals (each capable of dealing with 150 to 250 patients) at Novocherkask and other places.

The total strength of animals was said to be about 200,000. No mobile veterinary sections existed, and mange, glanders, and rinderpest were prevalent.

The next business of the A.D.V.S. was to obtain practical acquaintance with the existing methods of the management and treatment of sick animals by making a series of inspections in the vicinity of Ekaterinodar while waiting for the Russian authorities to provide railway facilities for inspections in the field. His reports on these inspections gave a graphic picture of the almost hopeless state of veterinary matters that prevailed and a forecast of what was later to be encountered.

In the course of an interview with the chief of the civil veterinary department, the latter informed him that since the revolution it had been impossible to deal adequately with outbreaks of contagious diseases, which had obtained such a hold that, in the most favourable circumstances, it would take at least four years to eradicate them. Epizootic lymphangitis was not a common disease, but the following were found everywhere :—

Mange.

Rinderpest.

Anthrax.

Swine-fever.

Glanders.

With regard to the request for horse-shoes, which the A.D.V.S. received on his inspections at Novorossisk and Krimaskaia, the A.D.V.S. learned from the A.D.O.S. that, although the S.S. "Huanchaco" brought on its first trip six months' supply of mule shoes for 500 animals, which were handed over to the Volunteer Army, none appeared to have been issued by the Russian authorities to units.

By arrangement of the Russian authorities the A.D.V.S. left Ekaterinodar on May 17th to see as much as possible of the veterinary hospitals and mounted units of the Don Army. His official report on this tour ended with the following words :—

"I have formed the opinion that the veterinary organization of the Don Army is quite good on paper, but in practice it can scarcely be said to exist at all."

The chief of the veterinary service of the Don Army submitted a heavy list of drugs and instruments of a highly technical nature, representing the requirements of the army for veterinary purposes. In view of the lack of evidence obtainable in the course of the inspections as to the facilities for the use of most of this material, it was decided, in agreement with the D.A. & Q.M.G. of the British Military Mission, not to take any action until it could be established that proper use was being made of the stores already issued.

At this time most of the material on charge of the base depot

of veterinary stores had been sent out in replacement, as far as possible, of the stores and equipment which had been captured by the Bolshevik forces.

On July 23rd a telegram was sent to G.H.Q., Constantinople, asking for 10,000 doses of anti-rinderpest serum and 50 syringes. In response to this demand, 250 litres of anti-rinderpest serum, obtained from the Turkish Veterinary Laboratory, and five syringes were sent.

During September, 1919, the A.D.V.S. made a tour of inspection on the Kharkov-Kieff front with the chief of the veterinary department of the armed forces of South Russia. His intention to visit the Tsaritzan front was altered, as it was learned that a large quantity of veterinary stores had been taken from the Bolsheviks and it was desired to obtain particulars with a view to amending the amount of veterinary stores to be supplied from British sources.

During November and December, 1919, the A.D.V.S. visited the headquarters of the Don Army and the 3rd Don Army Corps, and inspected the 1st Don Army Corps. He found the veterinary organization, general management, and shoeing of the animals in the 1st Corps in a bad state. Veterinary personnel was much below establishment, and there was a great shortage of veterinary material. Rinderpest was reputed to be increasing in the Don district, where the number of cattle was estimated to be 2,000,000. Consequently an urgent request was made for 100,000 doses of anti-rinderpest serum and 100 syringes as an additional supply. The request for veterinary stores asked for by the Russian authorities as a final contribution, for six months' supply for 300,000 animals, was forwarded to the War Office in December, 1919. No stores had arrived at Novorossisk since October 2nd, and by the end of December little was left for issue to the Russian authorities.

Arecoline was much used in the Russian Army, where, however, the doses of 2 grain tablets supplied by the British Army Veterinary Stores were considered to be too large.

Five cases of anti-rinderpest serum were received by the British Military Mission on December 24th, 1919, from the A.D.V.S. at Constantinople, and thirty-seven cases on February 3rd from the D.D.V.S., Egyptian Expeditionary Force. No other veterinary stores were received during December, January and February.

In February, 1920, the British Military Mission evacuated Taganrog and was located as follows :—

1. Advanced Denmiss at Tihoretskaia.
2. Denmiss, Ekaterinodar.
3. Rear Denmiss at Novorossisk.

The A.D.V.S. remained at Novorossisk, as the military situation prevented tours of inspection. A quantity of stores and office documents, including all those of the A.D.V.S., were lost when Taganrog was abandoned. The mission evacuated Novorossisk on March 26th, and moved to Theodosia in the Crimea.

All stores remaining in the base depot of veterinary stores were

handed over to the Russian authorities prior to the evacuation.

The establishment of the army veterinary branch of the mission after moving to Theodosia was :—

1. A.D.V.S.
- 1 Quartermaster.
- 3 Serjeants.

During the period January to March, 1920, the veterinary services of the armed forces of South Russia were completely disorganized. Many veterinary officers were separated from their units, and all sick animals unable to march with the troops were abandoned. A veterinary hospital evacuated from Kharkov marched by road to Bataisk, a journey of thirty days. On arrival there it was ordered to go on to Krimskaya, but when passing through the Kuban district all its material was taken away by the Cossacks, so that only the personnel of the unit arrived at Krimskaya. The animals which arrived at Novorossisk were worn out and in very poor condition, as the result of over-work, neglect, and shortage of forage during the retreat of the army. Owing to the lack of shipping, many units turned their animals loose on the quay and abandoned them before embarking for the Crimea.

The following veterinary stores were received and issued by the mission during the period January 1st to March 31st, 1920 :—

Received	{ 112,336 lb. sulphur.
	{ 212,260 c.c. anti-rinderpest serum.
Issued	{ 112,224 lb. sulphur.
	{ 212,260 c.c. anti-rinderpest serum.
	{ All stores remaining at Novorossisk.

Towards the end of March, 1920, the headquarters of the mission (including the veterinary branch) moved to Sevastopol. The chief of the veterinary services of the South Russian forces was able to evacuate about 2,000 poods of the most valuable part of the veterinary stores from Novorossisk, but a large quantity had to be left behind.

At that time the army in the Crimea comprised three corps, viz. :—

1. Crimea.
2. Volunteer.
3. Don-Kuban.

There were about 50 executive veterinary officers, and the total animal strength was roughly 10,000.

In the beginning of May, 1920, a list of the approximate requirements of the veterinary services of the Russian forces was submitted to the mission headquarters, but about the same time information was received that only veterinary stores for the use of the mission would in future be sent out.

During May and June, 1920, the A.D.V.S. was able to make a tour of inspection of units of the army in the Crimea, where he found veterinary matters at their lowest ebb. Shortly afterwards (in July, 1920) orders were received for the mission to embark for Constantinople, and the veterinary work in South Russia came to an end.

Military veterinary history hardly contains an instance of a more hopeless task than that which the A.D.V.S. of the British Military Mission was required to undertake. The conditions were of course unfavourable, and enthusiasm in so unsuccessful a campaign was not to be expected; nevertheless, when all this is taken fully into account, there remains, in the observations* of Lieut.-Colonel Harrison, a valuable object-lesson to the military student. It is clearly shown how futile and useless are technical skill and material in war when organization is faulty. It cannot be doubted that among the veterinary officers with the armed forces of South Russia were many skilful and scientific practitioners who, for lack of organization, could do little or nothing to prevent inefficiency or relieve suffering amongst animals. The animal strength of an army in the field, under conditions of modern warfare, can only be maintained by means of a veterinary corps acting independently, and liberally supplied with personnel and material.

TABLE A.

LIST OF VETERINARY STORES ISSUED TO THE ARMED FORCES OF SOUTH RUSSIA.

4 sets of Section Chests.	280 lb. Oleum Terebinth.
61 Officers' Chests (40 lb.).	114,464 lb. Sulphur Sub.
348 Unit Field Chests.	225 3 in. Bandages.
70 Officers' Wallets.	17 lb. Wool Absorb. in 1 oz. packets.
353 Wallets, Mark III.	2 lb. Tow Carb.
10,700 doses of Mallein.	15 lb. Tow Jute.
3 Syringes (brass) 3 oz.	2 lb. Hydr. Perchlor Tabs.
3 spare nozzles.	56 lb. Camphor.
20 Hypo. Syringes, 1 c.c.	2 tins Vaseline Boric.
50 spare needles.	2 tins Lysol.
77 Thermometers.	4,300 doses Anti-Rinderpest Serum (50 c.c.).
3 Drenching Tins.	15 Serum Syringes.
2 Stewart's Clipping Machines.	15 Needles.
12 spare Heads.	5 Serum Injectors, Metal, in case.
2 Hand-clipping Machines.	60 Tubes Iodum Powder.
5 Singeing Lamps.	26 Cases Needles, silk and tape.
8 lb. Gum Acacia.	5 Dissecting Forceps.
24 lb. Adeps Prep.	5 Searching Knives.
222 dozen Aloetic Balls.	4 Alumin. Measures, 20 oz.
246 dozen Ammon. Carb. Balls.	71 Folding Scalpels.
70 dozen Chloral Hyd. Balls.	40 pairs Curved Dressing Scissors, 6 in.
16 lb. Creosote.	2 hanks Ligature Flax.
2 lb. Cupri. Sulph.	
4 oz. Hyd. Iodid. Rub.	
80 lb. Oleum Dressing.	
1,600 lb. Oleum Cetacei.	

* Full details are given in his official reports, which could not be included in this history.

CHAPTER XXI.

THE VETERINARY SERVICES WITH THE BRITISH REMOUNT COMMISSION IN CANADA AND NORTH AMERICA.

TWENTY civilian veterinary practitioners were engaged in the United Kingdom and sent to Montreal in September, 1914, to join the British Remount Commission at the beginning of its operations.

Lieut.-Colonel F. B. Drage, a retired veterinary officer of the Royal Horse Guards, who was residing in the United States at the outbreak of war, was appointed Senior Veterinary Officer with the Commission. Captain Hylton-Jolliffe, another retired veterinary officer of the Household Cavalry, who was residing in Canada, was also appointed for duty with the Commission. Seven more civilian practitioners were sent out from England during October, November and December, 1914. The total number sent to join the Commission during the war was forty, and, in addition, there are records of twenty-two Canadian and American practitioners who were engaged locally.

In consequence of the heavy mortality that occurred at sea and on arrival in England among remounts from Canada during the winter of 1914-15, it was decided in February, 1915, to send Brigadier-General C. E. Nuthall, Deputy Director, A.V.S., to inspect and report upon the veterinary services with the Commission. His inspection covered the period of March 2nd to 22nd, 1915, and included visits to all the principal remount depots and ports of embarkation.

On his return he reported, among other matters, that Lieut.-Colonel F. B. Drage, who as already mentioned was appointed Senior Veterinary Officer to the Commission, was performing the duties of superintendent of the Lathrop depot, and that the general officer commanding the commission had no veterinary staff at his headquarters at Montreal.

Consequently, it was decided that an officer of the Army Veterinary Corps, with remount experience, should be sent to Montreal to organize the veterinary services and advise the G.O.C. on all technical questions. The officer selected, Captain A. F. Deacon, was appointed principal veterinary officer, with the temporary rank of major, and embarked for Canada on April 25th, 1915. He was subsequently given the acting rank of lieut.-colonel.

The mortality among animals on board ship and on arrival in the United Kingdom was considerably reduced during the summer of 1915, and never again assumed serious proportions. This reduction was due in great part to the practice of shipping only healthy animals, which followed the appointment of Captain Deacon.

The mortality among animals in the veterinary hospitals of the Commission remained, however, abnormally high, and actually increased during the latter half of the year, 1916, from 6 per cent.

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of admissions in June to 23 per cent. in November. The following table shows the actual figures, and includes a comparison with the figures of the veterinary hospitals with the expeditionary forces and in the United Kingdom during a similar period :—

Sick Horses in Veterinary Hospitals in Canada.

Month.	Admissions.	Died and Destroyed.	Percentage of Loss.
1915.			
June	5,663	765	13½
July	18,770	3,145	16¾
August	9,549	1,617	17
September	8,626	1,234	14
October	14,475	1,976	13½
November	9,886	1,333	13½
December	3,906	505	13
1916.			
January	3,341	228	7
February	1,734	139	8
March	856	64	7½
April	690	97	14
May	482	47	9¾
June	3,004	179	6
July	4,189	303	7¼
August	4,808	506	10½
September	6,077	807	13¼
October	6,421	1,159	18
November	5,895	1,394	23½
Total	108,372	15,488	14.29
British Expeditionary Force :—			
Jan. to Nov., 1916	299,082	* 17,841	5.96
Home Commands :—			
Jan. to Oct., 1916	261,664	* 9,898	3.78

This is not in some respects a fair comparison, as most of the the animals dealt with in the latter hospitals were those which had become seasoned ; moreover, the climatic and other conditions obtaining in the Canadian winter are extremely trying. A further important reason for this heavy mortality was the careful observance of the policy already mentioned of shipping only healthy animals, so that sickly animals died in Canada instead of on board ship or in England after landing.

It was considered, however, that, after making every allowance, there still remained room for improvement in the measures taken to prevent and alleviate diseases among the animals awaiting shipment in Canada. Consequently, it was decided to replace the existing principal veterinary officer by a senior officer of the A.V.C. who had

* These figures relate only to animals that died or were destroyed on account of fatal disease or injury ; destructions for economic reasons are not included.

gained experience from the more extensive opportunities of service with the British Expeditionary Force. In pursuance of this decision, Colonel A. Olver was appointed to the Commission as deputy director of veterinary services, and arrived at Montreal on June 27th, 1917.

After arrival at Montreal, he spent two or three days in studying the conditions existing at the depots in the neighbourhood before officially taking over the duties. After seeing the condition of these depots he discussed the whole situation with the general officer commanding, and pointed out that the policy then in operation at the Lachine depot of holding large numbers of animals congregated in more or less open paddocks and corrals had been generally abandoned elsewhere because these paddocks unavoidably became extremely muddy and insanitary during the wet weather or thaw. It was consequently recommended that covered accommodation, with hard standings, should be provided for all remounts as soon as possible. With reference to the cost of these measures, it was mentioned that in the French theatre of war, even when animals were only expected to remain during short periods in any one place, it was considered necessary to provide hard standings for every animal and cover wherever possible. It was also pointed out that the existing hospital accommodation at Lachine was inadequate, and that much of it was in an insanitary condition owing to faulty location and construction, the want of proper flooring, and the policy of allowing the animals in the convalescent sections to move in and out of open sheds at will.

The practicability of establishing a dipping bath at each of the main shipping depots for the control of mange was at the same time carefully considered, but the clipping and dipping of animals freshly purchased in America and Canada was found to be a delicate matter to handle. Approximately 75 per cent. of these animals passed through "shipping fever" shortly after their train journey from the west, and it was decided that the treatment of mange by means of dipping-baths would be too dangerous in such a severe climate.

The cases were therefore dressed by hand, and arrangements were made to test the efficacy of a sulphur fumigation chamber for the treatment of this disease. Plans were drawn and contracts eventually placed for the erection, both at the shipping depot and at Lachine, of sulphur fumigation chambers on the lines of those already in use in France but somewhat more elaborately fitted, and for a large hospital building, specially designed for the treatment of pneumonia cases, at Lachine. The work was carried out during the late summer and early autumn of 1917, and both buildings proved of the greatest value.

At a later date authority was obtained for some improvements to existing hospital accommodation at other depots, but because the provision of covered accommodation with hard floors for all animals was considered to involve too great an expenditure, the

majority of the animals at Lachine had to remain in the open throughout the winter.

Before the D.D.V.S. left Montreal he took the opportunity of enquiring locally into the system adopted in regard to the embarkation of animals, including the selection and final examination at depots, the arrangements for their departure by rail, and their examination on the wharf immediately prior to going on board.

The officers engaged in these examinations all had great experience of this work, which appeared to be carried out in a thoroughly practical way. No changes in the system were therefore considered necessary with the exception that, later, the taking of temperatures during the examination of animals at depots for shipment was adopted, and the veterinary embarkation branch was placed on a more definite system than had obtained previously.

Early in July, 1917, it was decided to utilise as a remount depot the Lepestre Miller Stock Farm at Goshen, N.Y. Though not ideal, this depot had the great advantage of providing covered accommodation for about 2,500 animals. Arrangements were consequently made for it to be taken into use at once.

Arrangements were also made for :—

- (1) *The routine taking of temperatures of off-loading stations and all points of despatch.*
- (2) Greater attention to disinfection everywhere.
- (3) The introduction of a system of marking each animal with a tail-tag bearing a serial number and the initials of the veterinary officer responsible for passing it.
- (4) The introduction of a new system of veterinary returns, to provide exact information as to the prevalence of disease, and build up a system of statistics on which conclusions might be based. Up to this time there had been no means of tracing individual animals or the origin of disease with any exactitude, nor was there any system of statistics by which results could be checked.

On July 19th, 1917, the D.D.V.S. left Montreal to close down Lathrop depot and to carry out a rapid inspection of the depots and purchasing centres at St. Louis, Green Island, St. Paul, Chicago, and Toronto.

During this tour the open air depot system was seen in operation at Lathrop, also the arrangements for the care of remounts at purchasing points. At the same time an inspection was made of the old East Alton depot and the Union Stock Yards, Chicago, with a view to accommodation being obtained for remounts immediately after they had been bought until they could be despatched to the east in trainloads. The D.D.V.S. also attended the Kansas State Veterinary Congress and took every opportunity of studying, by personal observation and all possible enquiries from veterinary surgeons, dealers, contractors, and others, the entire system of handling animals on the American continent.

The general opinion expressed at that time by almost every officer of the commission, and by dealers and stockmen, was that infection contracted in public stockyards caused the greater part of the large amount of the sickness and high mortality which occurred among our animals. The veterinary evidence obtained from actual experience at Lathrop, Harrington's Yards, St. Louis, Calumet, and Toronto, as well as at Montreal and all dealers' yards, did not, however, coincide with this. Apart from the inherent defects of the open air system, the grossly infected and insanitary depots of the British Remount Commission, and the careless system of feeding in dealers' yards, appeared to be the factors mainly responsible for the steady increase in sickness and mortality prior to embarkation.

The stockyards themselves, both at St. Louis and Chicago, were infinitely cleaner and more sanitary than most of the depots of the British Remount Commission, and though there might be slight danger of animals contracting contagious disease in large public stockyards, it was considered that, provided a section of such yards could be definitely handed over and placed under the control of the commission, this objection could be almost entirely overcome. That this view was correct was afterwards proved at Chicago and Jersey City stockyards, both of which, though regularly used as public stockyards all the time, were found to be highly satisfactory depots for remounts.

On August 20th, 1917, with a view to placing the organization of the hospital section of all depots on a more satisfactory basis, it was recommended that a definite establishment of subordinate civilian personnel should be sanctioned for the veterinary care of the animals and sanitation at all depots, and that in future the responsibilities of the British Remount Commission and feed contractors should be clearly defined as follows :—

- (1) The British Remount Commission to be responsible for the entire care of animals which are so sick as to require individual treatment, grooming, etc., in hospital pens and stalls ; the dressing and nursing of all cases ; the disinfection of the entire depot ; and the detection of the sick, and their removal from among the healthy animals.
- (2) The civilian contractor to be responsible for the feeding and handling of healthy and convalescent animals ; for the cleanliness of the entire premises, except the hospital pens and stalls ; the removal and sanitary disposal of all manure ; and the maintenance of all buildings, fences, drains, etc., in a thorough state of repair, including roads and floors. For this work he might be permitted to use a certain number of convalescent animals at the discretion of the O.C., but he was to provide all the harness, vehicles, implements, etc., required for the work of the depot with the exception of any special requirements for hospital work.

This recommendation was sanctioned, and the approved establishment was published in September, 1917, as follows :—

- (1) STABLEMEN : At the rate of one man to every ten sick animals in hospitals, pens and stables, and one foreman to every twenty stablemen.
- (2) DRESSERS : One to every 100 sick animals, and one foreman for each depot.
- (3) DISINFECTING STAFF : One man to every 500 animals in the depot, including those in hospital, and one foreman for each depot.
- (4) STOCKMEN : For sorting sick from healthy : one man for every 750 animals in a depot, including the sick, and one foreman for each depot.

The proportion of men to be furnished by the contractor was provided for in the feed contracts, and varied at different depots.

Before this establishment was adopted, though a few special men had been employed and paid and trained by the commission for the care of the sick, the number was always totally inadequate, and veterinary officers were at the mercy of the contractor for any extra labour they required. This was most unsatisfactory because, apart from the number supplied never being sufficient, the men looked upon themselves as employees of the contractor, not of the commission ; and as they were always liable to be changed they could never be satisfactorily trained in any special duties.

By this change, and by constant attention to disinfection, a great improvement in the condition of the hospitals and sanitation in general was brought about.

Another matter which received early attention was the system of feeding which had been hitherto in operation at all the depots, and which was very similar to that which obtained generally in the dealers' yards. This system consisted of feeding the animals once a day with large quantities of hay placed in capacious hay-racks, usually in the open, and seldom cleaned out. The amount of grain given was not small, usually oats and maize mixed—oats 7 lb., maize 3 lb. a day—with a high proportion of bran (5 lb. a day) for horses, and somewhat less for mules. In dealers' yards this grain, mixed with water, was allowed to remain in the mangers indefinitely, and successive batches of animals, all freshly purchased and coming from all parts of North America, were allowed to muzzle this over and eat it if they felt disposed. With a large proportion of the animals discharging freely at the nostrils, any better system of spreading disease could hardly be devised. Moreover, the hay, left in open hay-racks, was liable to become much deteriorated and even harmful in rainy weather.

As this system was thought likely to be a fruitful source of infection, it was recommended that all animals should be fed twice a day, the mangers and hay-racks being cleaned out after each feed. More frequent feeds for the healthy were hardly possible with the limited staff available, but the sick were fed more frequently.

These recommendations were approved, and on September 6th, 1917, instructions were issued accordingly.

During the months of September, October and November, 1917, constant consideration was given to the question of obtaining further depots and improving existing accommodation.

On August 16th, 1917, the attention of the general officer commanding was drawn to the unsatisfactory position at that time as regards a reserve of horses. This had fallen so low that it was necessary to ship animals which had not completely recovered from their sickness in order to fill the ships.

Past experience in this country had shown that provision should be made for a reserve of at least two months' purchases, and during the months of October, November, and December, 1917, such a reserve was steadily built up and necessitated more accommodation than was at that time available. The extra accommodation already secured at Chicago, East Alton, and by the increase of Calumet, was insufficient, particularly as Chicago could now only be used for 500 animals. In consequence of this, arrangements were made in October, 1917, for the veterinary inspection of some railway sheep feeding stations at La Fox, a little west of Chicago, with the object of making use of them if possible. The inspecting officer reported that the buildings, which consisted of large, airy and well-lighted barns, were very satisfactory for the purpose, and would accommodate a maximum of 1,800 animals all under cover.

La Fox was accordingly secured and was opened on November 28th. This depot was of the greatest value to the commission up to June 9th, 1918, when it was closed on arrangements being made to use the Chicago stockyards in future to the full extent contemplated when accommodation was originally secured at those yards.

In November, 1917, a small shipping depot was secured at Portland for the accommodation of the animals shipped from that port, and also at Halifax. All of this added considerably to the total accommodation available, but there was never sufficient to allow for an adequate working margin. In operations of this kind in America, provision should, it is thought, be made for the accommodation of at least two months' purchases.

During October, November and December, 1917, endeavours were made to obtain sanction for the erection at the main shipping depots of cover for every animal, sick or well, and for the building up of stable and pen floors with stone or other material. Particularly at Lachine, one of the largest shipping depots, conditions had become very unsatisfactory owing to the want of sufficient covered accommodation. This depot was a typical example of the open air system, and no new buildings had at that time been provided except in the hospital section.

In consequence of this lack of covered accommodation a large number of cases of gangrenous dermatitis occurred at Lachine during the latter part of November, 1917, and, in order to prevent the heavy mortality which otherwise would have undoubtedly occurred,

arrangements were made to move the affected animals by train to the Grand Trunk and Rosemount depots, Montreal, where better accommodation existed. A number of healthy animals were also at this time removed to these depots from Lachine, and others were placed on fresh ground taken up by the contractor for the purpose. By this means the old infected paddocks were entirely evacuated and, the ground becoming frozen a week or two later, the holding of the animals in the open was more satisfactory from that time forward until the spring thaw.

This experience further demonstrated the impossibility of holding large numbers of animals in a comparatively restricted area under muddy conditions ; and authority was given for the erection of two new hospital buildings and two large covered sheds at Goshen depot. This work was completed before the end of 1917.

In February, 1918, attention was again drawn to the necessity for the provision of more satisfactory accommodation at all of our depots by a letter received from the Director-General, Army Veterinary Services, reporting that heavy mortality had occurred, and that a great deal of sickness still existed, among the animals received in England from certain horse transports, the names of which were given. When this letter arrived, orders had already been received to close down purchasing operations and to arrange for the maintenance in depots of 12,000 horses for shipment at an indefinite date later. Consequently, as it seemed possible that purchasing would not be resumed, it was not thought that the commission would be justified in spending the large sums of money required to bring the existing depots up to the standard necessary for normal operations.

As, however, circumstances required the holding of this number for a period of some months, including the period of the spring thaw, it was pointed out that it would be economical to spend a reasonable sum in improving the conditions at the depots at which it was decided to keep the animals.

When this recommendation was made it was possible to demonstrate from statistics that the cost to the Government of the outbreak of dermatitis which had occurred at Newport News in 1917 had been certainly more than \$25,000 during the six months July to December, 1917, and that over and above this there was the still more serious loss from pneumonia which, though not so easily demonstrated in figures, was far greater and equally due to the insanitary conditions which were certain to recur if steps were not taken to improve the accommodation then existing.

Authority was accordingly obtained for strictly limited amounts to be expended on the following services, viz. :—

- (1) The erection of fences at the Newport News depot, to enable the animals to be kept under cover, and the building up and drainage of the floors of sufficient buildings for 2,500 animals at that depot.

In March, 1918, the D.D.V.S. visited Newport News with Lieut.-Colonel Bridges and made arrangements for

the authorized amount to be expended to the best advantage to improve existing accommodation. The amount authorized was not sufficient for any extensive reconstruction and the work done was a makeshift ; but that the expenditure was amply justified was proved later in a very striking way.

During the early summer of 1918 it was found possible to hold 2,500 animals in Newport News without any serious trouble from dermatitis, whereas later, when in consequence of purchasing having recommenced, certain other accommodation had to be occupied at Newport News, on which no money had been spent, a serious outbreak of dermatitis occurred and was confined to this latter section.

- (2) The entire re-modelling of the depot at Toronto West in accordance with veterinary suggestions, as it had been found impossible to obtain another depot in that district.

The floors of the covered building at this depot were dug out to a depth of from eighteen inches to two feet and filled up with new material until they were raised well above that of the outside paddocks ; gates were provided so that the animals could be kept inside except when turned out for exercise ; and large openings were made for light and ventilation under the eaves on both sides of the entire length of all the buildings. The entire woodwork was scrubbed thoroughly with caustic lye. From that time forward this depot was maintained in a highly sanitary condition and, as then organized, was satisfactory for our animals though the location could never be made a good one.

- (3) The provision for further covered accommodation in the hospital section at Lachine, which with the buildings erected by the contractor made it possible to place 2,500 animals under cover at that depot.

On completion of the above work the only depot which continued to operate largely on the open air system was that at East Alton. This depot, in consequence of the dry nature of the soil and the already existing buildings, was reported as likely to be satisfactory until the animals could be moved to the east on the resumption of shipping, but this did not prove to be the case in all respects. A certain amount of dermatitis occurred up to the time the depot was closed at the end of July, 1918, and it was subsequently found that the animals moved from East Alton to other depots were unthrifty, and a number died, particularly at Newport News, as the result of colic caused by sand picked up in the open paddocks at East Alton.

The building up of the floors in the pens of the main depot at Rosemount, pen by pen, was also carried out

during the summer of 1918; the object was to raise the inside level of all the buildings well above that of the outside ground and thus provide reasonably sanitary standings, the animals being kept inside in wet weather by means of gates which had already been provided for this purpose on veterinary recommendation.

In February, 1918, on receipt of orders from the War Office to reduce the numbers of horses to 12,000, arrangements were made for the thorough re-examination by veterinary officers of all the animals then on hand with a view to the elimination of any that were not absolutely sound. The majority of those sold at this time were to a certain extent unsound, but many of them would have been fit for service in ordinary circumstances.

From the middle of February to the middle of May, 1918, there was no purchasing; but mortality, mainly on account of pneumonia, continued at a high level for two months after purchasing had ceased. Statistics of past working show that this always happens to some extent when buying is interrupted: the actual deaths from pneumonia do not usually occur until from a month to six weeks after the date of purchase, and often much later. In this instance, however, conditions were exceptionally unfavourable because purchasing ceased at the worst time of the year, after an extremely severe winter, with most unsatisfactory railway conditions, during which movement by train was almost an impossibility and extremely trying to the animals. Depots such as Calumet and Toronto had consequently become overcrowded with sick, and the mortality at these two depots during December, 1917, and January, 1918, was excessively high, and continued to be so among the animals from these depots when they were moved elsewhere.

Early in May, 1918, instructions were received to recommence purchasing, and a few animals were bought during that month but the number was not large until the beginning of June.

Previous to this the sanction of the G.O.C. had been obtained to test the system of handling our animals which had been recommended from the commencement, i.e. to concentrate as many as possible in the Chicago stockyards immediately after purchase and to despatch them, after their temperatures had been taken, in trainloads to our eastern shipping depots where any developing sickness could at once be treated with serum.

From the first the results of this system were superior to those previously obtained. The animals arrived in much better condition, and though the majority developed fever or respiratory disease of some kind, as was anticipated, they were in much better condition to withstand it, and the mortality on land and loss of condition were much less than formerly, while shipping figures were better than ever before.

To these satisfactory results it is believed that the systematic use of serum contributed; but the facts that Calumet had been closed, "The Corrals," Toronto, reconstructed, that more cover

was available, that better floors had been provided at all of the depots, and that routine temperature taking was practised, helped considerably to reduce mortality during this period. Had it not been necessary to destroy a large number of animals on account of a serious outbreak of glanders which occurred at Lachine in August, 1918, and in order to save expense during the final closing down, the results would have been even better. With a thoroughly organized veterinary service responsible for the health of the animals it is considered that the mortality in similar future undertakings in America could be kept constantly below 3.5 per cent. and often below 3 per cent.

Veterinary Duties.

Prior to July, 1917, the status of the D.D.V.S. (then P.V.O.), British Remount Commission, and of the whole veterinary service of that commission, was a most unsatisfactory one. The D.D.V.S. had no separate office for the administration of his service, and occupied an entirely subordinate position under the senior officer. That efficiency is bound to suffer when the veterinary service is placed in such a subordinate position, and not invested with sufficient status to ensure its expert recommendations being carried out, was amply demonstrated in the excessive losses which took place at Lathrop during the winter of 1916-17, and at Calumet during the following winter, as well as in the improved results obtained after the adoption, in May, 1918, of the policy which had been advocated ever since the veterinary tour of inspection in July, 1917. It was found to be essential to efficiency that the representative of the Director-General, Army Veterinary Services, should be given full responsibility for every veterinary and sanitary matter, including the sole control of the professional work of individual veterinary officers.

The D.D.V.S. is in possession of full information regarding the incidence of disease. He is consequently in a position to interpret the effect of general policy on the health of the animals and to sift and make use of the individual knowledge and experience of veterinary officers. It is impossible for officers with no special training and no previous experience of veterinary work to report satisfactorily on such officers. That this is the case has been very clearly shown in the operations of this commission. The arrangement by which veterinary officers employed in command of remount depots and on embarkation duties are considered to be serving directly under the G.O.C., and not under the D.D.V.S., is also unsatisfactory. However highly trained and practical such veterinary officers may be, they are not in possession of the exact information obtainable by the D.D.V.S. from his records, and are not in a position to advise on matters of general policy. On such matters the D.D.V.S. is in a position to advise and he should be held responsible for giving such advice.

In the operations of a remount commission, in which 75 per cent. of the animals pass through a severe and dangerous form of sickness,

there are practically no exclusively remount duties after the animals have been bought and classified, while the duties of the veterinary services are relatively far more important than in the ordinary operations of a military formation. The function of such a commission, after the animals have been purchased, consists in getting them through their sickness, convalescence, mallein testing, and final examination prior to embarkation, and in transporting them overseas. These are purely veterinary duties, and however small a depot, feeding station, or port of embarkation may be, it is necessary to have one or more veterinary officers to carry them out.

Examination Duty.

Veterinary examination for soundness is a particularly difficult and responsible duty in Canada and America; not only are the animals often partly broken, but the facilities for examination are not always of the best, and the arts of the fraudulent horse dealer are often put into use to deceive the examiner. Sponges for instance are placed up the nostrils to hide unsoundness of wind; animals are "set" in various ways for the purposes of cloaking broken wind; teeth are scientifically "bishoped" to deceive as to the animal's age; ice is placed in the rectum to hide high temperature; and various dopes are given to stimulate sick animals to temporary activity. When an animal has been actually bought, unless the utmost care is taken to ensure that substitution cannot take place, this will of a certainty occur in a proportion of cases. Moreover, animals which have been rejected once are disguised in various ways and constantly offered a second time, either to the same veterinary officer or at a different purchasing centre, even hundreds of miles away, and every possible pressure is liable to be placed on veterinary officers to relax their standard of examination. To be suitable, therefore, for this work a veterinary officer requires to be exceptionally reliable, painstaking, and knowledgeable, and should receive every support and consideration from the purchasing officer with whom he is serving. The examining veterinary officer is entirely responsible for the soundness of the animals passed, and his professional opinion must be accepted.

At the time when operations were closed down this commission was exceptionally fortunate in the matter of its veterinary officers engaged on examination duty. By a process of elimination unsuitable men had been got rid of or employed on less exacting duties, and it would be very hard to make any distinction between the eight veterinary officers who were employed on examination duty at that time.

Depot Veterinary Officers.

Of even greater importance perhaps, but demanding somewhat different qualities, is the duty of a senior veterinary officer at a depot. With the very large number of remounts passing through their hands, and the large amount of sickness developing amongst

the animals, the veterinary staff of a remount depot had very exacting duties to perform, and statistics clearly show that the success or otherwise of a depot in point of mortality depends almost entirely on the senior veterinary officer.

A.V.C. Personnel.

Latterly, by arrangement of the Director-General, Army Veterinary Services, a certain number of A.V.C. N.C.Os. and men were sent from England for special duties. They did not, however, arrive until after the armistice had been declared and could not be employed in the way originally intended, i.e. purely as dressers and assistants to veterinary officers in depots and at purchasing points. They were, however, of the greatest assistance at the depots to which they were posted in Montreal in taking entire charge of hospital sections under their own N.C.Os. and getting the sick ready for discharge in good condition for sale. Their training was very good, they were far cheaper than the indifferent labour obtainable locally, and all their commanding officers reported that the standard of efficiency was very much raised by their work.

There were, however, with this commission quite a number of very useful practical horsemen, who had had a great deal of experience in the treatment of sick animals in local hospitals, and some of these men ultimately became valuable veterinary assistants. The ordinary labourer, on the other hand, was usually a Russian, or at any rate a foreigner who could not speak English and knew little or nothing of horses or grooming.

D.D.V.S. Office.

For the purpose of the administration and command of an efficient veterinary service, and for the collation and collection of exact information regarding disease, a thoroughly organized veterinary office is necessary at headquarters of such a commission as this. Such an office did not exist prior to July, 1917, and in consequence, although a good deal was done afterwards in extracting information from various sources, the records are still not nearly as complete or exact as they should be.

Type of Depot and Building.

For a long time every officer of the commission appeared to be of the opinion that the animals must at all costs be allowed to run loose in more or less open paddocks. This opinion was probably due to experience in the dry South African climate, where such a method of handling animals is possible, and to the fact that horses do well on ranges in America and Canada. It did not appear to be recognized, however, that such ranges never become so extremely insanitary as the comparatively small paddocks of a remount depot inevitably do when large numbers of animals are congregated in them for any length of time in a rainy climate. However good the

soil may be naturally, and however much may be done in the way of regular cleansing, small paddocks are certain to become heavily infected and most insanitary after a few months or even weeks under these conditions. Moreover, any paddock accommodation becomes extremely muddy and insanitary when a thaw occurs. Snow and ice while frozen hard hold a large quantity of droppings and other infective material in a comparatively innocuous state, but immediately the thaw takes place conditions become most unfavourable.

No account appears to have been taken of the fact that 75 per cent. of remounts which develop what is called "shipping fever" within the first two or three weeks after purchase are in a very delicate state of health for some considerable time after completing their very trying journeys by rail, the average distance covered being 1,200 miles from the time of purchase to their arrival at the coast.

Coming as they do usually out of hot stables, and having passed through a number of infected dealers' yards before being bought, even if they are not actually sick at the time of arrival at the seaboard they are probably in the incubative stage of sickness. To turn such animals immediately out of a hot train into open paddocks, which were often in a very muddy condition in the spring and autumn, or frozen hard with the thermometer below zero in the winter, appears to be an indefensible policy. Every animal on arrival at a depot, and for three weeks afterwards, should be kept entirely under cover and treated in every respect as being in a very delicate state of health.

The main reason for putting the animals into open paddocks seems to have been the fear that they would suffer in health if not regularly exercised and not allowed to run out in the open air.

Wherever commanding officers had open paddocks available, there was always a tendency for them to turn the animals out into these for a certain time every day with a view to giving them fresh air and exercise. This is advantageous in fine weather if the paddocks are quite small and dry, but there is little doubt that it is a very dangerous policy unless the animals are constantly watched and brought in immediately rain or a cold occurs. Experience with this commission amply proved the following points:—

- (1) It is dangerous to exercise freshly purchased remounts, a large proportion of which are in the incubative stages of disease, or to turn them out into large paddocks. They are certain to gallop freely when first turned out, and are constantly exposed to whatever cold rains or wind may occur.
- (2) Satisfactory daily and close observation of each animal individually and the taking of temperatures are impossible in large open paddocks; animals may become seriously ill before their indisposition is noticed, and the prospect of obtaining good results from any form of treatment is correspondingly reduced.

- (3) It is often impossible in large open paddocks to catch individual animals without rounding up and exciting all the others in the paddock.
- (4) It is impossible by any system of cleaning, however thorough, to maintain such paddocks in a sanitary state when large numbers of animals are held in them for any length of time.

The only advantage the open paddock has over the covered pen is more fresh air and sunlight, but if the pens are properly constructed this advantage can be sufficiently provided for without exposing the animals to risk of chills in the open.

Statistics also show that, other things being equal, the most successful depots have been those which consist entirely of comparatively small pens under a roof which provides plenty of light and ventilation, and this type is unhesitatingly recommended for future operations in any climate where rain may be expected even in moderate quantities.

Should there be space available, it is perhaps an advantage to have a small open paddock outside each pen so that the animals can be turned out at will, but this is not by any means essential, and these pens have the disadvantage that it is most difficult to ensure that the animals are never allowed to remain out in cold rain or wind in a muddy paddock. If the paddocks are small (45 ft. by 45 ft.), the objection on the ground of the animals galloping does not arise.

In the United States and Canada such covered accommodation as that recommended above is practically found only in public stockyards. These yards in most cases consist of small pens constructed with a view to holding a car-load of animals or less, and the pens secured in Chicago stockyards in August, 1917, on veterinary recommendation, are typical of this class of accommodation. The average measurements of these pens were as follows :—

Square pens in series, 32 ft. by 32 ft., with paved brick floors, draining to a trap in the centre and separated from contiguous pens by open fences and from the next series of pens by a paved alleyway 14 ft. wide. Height at eaves 10 to 12 ft., and at ridge about 12 to 14 ft. Separate water trough in each pen.

Two or three series of such pens were covered by one roof and were open on all sides, except the one exposed to the prevailing wind which was entirely boarded-up and provided with large glass windows along this entire side, under the eaves. Ventilators were put in over the alleyways, and a space for the passage of air under the roof was made in the boarded-up side after the accommodation was taken over.

The partitions between pens in all stockyards consisted originally of open rails only, and it was thought necessary to have these boarded-up to check the spread of infection from one pen to another ; but these pens had the great advantage from a sanitary point of view that, having paved floors, they could be kept clean and maintained in

a sanitary condition throughout, while as they were open on all sides air passed freely.

A great deal has been said of the danger to our animals of contracting all kinds of contagious disease in such public stockyards, but experience has proved that, provided a section in such public stockyards can be taken over for the sole use of remounts, this danger can be safely ignored. During the final eighteen months such accommodation was constantly used at the Chicago stockyards, the Grand Trunk stockyards, Montreal, and the Jersey City stockyards, New York. The statistics of these depots compared very favourably with those of other depots. The condition of the animals was also better in these depots than in depots where the animals had more liberty in the open. If it were necessary to hold animals for several months, provision would have to be made for exercise, after the first three weeks or month, to maintain health over a long period; but the main object of the operations of the commission was to ship the animals as soon as they were fit. For this purpose the comparatively small covered pen provided all that was necessary. It is surprising how much exercise animals can take in the course of each day in a pen 45 ft. by 45 ft.

In a large depot, where large numbers of sick have to be dealt with, it is desirable to have a certain amount of open air accommodation where convalescents can graze and recuperate in the fresh air. The want of such accommodation is the greatest objection that can be raised to the use of entirely covered stockyards and pens.

One of the largest depots, the Goshen depot, was built, prior to its occupation by the commission, to provide for a system in which the animals were placed under cover at night in large buildings some distance away from the moderate-sized open paddocks in which they were turned out during the day.

Provided that the buildings are constructed in such a way as to give ample ventilation and light, and the animals can be kept under cover whenever necessary, such a system is capable of giving fair results, but it seems far better to have the open air paddocks alongside the covered pens and to feed the animals inside. Otherwise, if they are run out in the morning, and the afternoon hay and feed are placed in the racks and mangers in the open paddocks, the animals practically have to remain until the evening, even if rain or a cold wind occurs.

At first the only depot built more or less on the small-pen plan, entirely for remounts, was at Rosemount, where the accommodation consisted of covered pens roughly 45 ft. by 45 ft., each large enough to take about a car-load of animals, with an open yard outside of about the same size. There were, however, no gates to keep the animals inside when required, and so they were fed partly outside and partly inside. Consequently, movement in and out of the covered pens went on more or less the whole time, with the result that very quickly a deep furrow was worn in the entrance and for some distance inside and outside. In course of time this became

a large excavation, and when rain fell this furrow became filled with liquid manure or mud through which the animals had to pass every time they went in or out of the shed. Such a condition was most insanitary. Not only was there insufficient dry space for the animals to lie down comfortably inside the buildings, but as a result of the animals passing through this mud and filth the drier portion of the shed was rendered insanitary by the material brought in on their feet. This was ultimately remedied by having the floors built up with stone to a height well above the outside level and by keeping the animals entirely inside in wet weather. The cost of building up the floors was considerable, and the work was not completed until the summer of 1918. Gates to enable the animals to be kept inside when necessary had already been provided on veterinary recommendation.

In the public stockyards the floors usually consisted of brick or stone setts, which from a sanitary point of view were very satisfactory, though objectionable unless sufficient bedding, sand, or ashes were provided to prevent slipping.

The best floor for pens in any of the depots was one made of sand-stone metalling, coarse at the bottom and gradually getting finer until the top layer which was formed of fine screenings; this provides a sufficiently hard surface, particularly when quicklime is constantly used, and yet is never slippery nor too hard for the animals to lie down comfortably.

At the big pneumonia hospital at Lachine a very good floor was made of tar macadam. This was rough enough to prevent slipping, and provided an absolutely impervious floor capable of withstanding a considerable amount of wear.

Hard ashes and clinker, if free from nails and bits of steel, also make a good floor for pens.

Whatever floor material was used, great benefit was derived from the free use of quicklime. From the beginning of 1918 this was allowed, on veterinary recommendation, at the rate of one pound a day for each horse, and was scattered on the surface immediately after the manure had been removed. Used fresh in this way quicklime had the double effect of destroying infective material and drying up and hardening the floor, and no difficulty was ever experienced from burning of the feet or skin.

*Earlier in this chapter mention is made of a large hospital building at Lachine which was specially designed for the treatment of pneumonia. This hospital was almost ideal for the purpose. By the form of construction adopted the animals on both sides of this stable were enabled to obtain the benefit of all the sun available, and stagnation of air was prevented by not carrying the boarded-up stall divisions to the outside wall, thus leaving a passage both in front of and behind the animals, while the other two sides of the boxes were open fences only. Ample ventilation was provided over the horses' backs so that there were no draughts, while at no time

* See page 452.

of the day or night could any stuffiness be detected by anyone entering from the outside, though the stable was always practically full to its maximum capacity of 250 animals, most of them very sick.

The floor was a rough tar macadam made with hard stone and impervious to moisture, which never became slippery and withstood wear satisfactorily.

For the purpose of removing carcasses, manure, etc., an overhead travelling trolley was installed, running the whole length of the building. At one end there was a small office, a hot water boiler, and an operation room which obviated the necessity of an animal having to leave the building. Two animals were ordinarily placed in each space between two boarded-up partitions, but in special cases, or when the stable was not full up, these spaces could be used as loose boxes. Each animal had its own bucket and feed trough, and the place of attachment of these was so arranged as to prevent one animal from reaching the feed of the next.

At Newport News, however, where the climate is entirely different, pneumonia cases did well in a series of covered pens, boarded-up only to a sufficient height to prevent draught on the body, and placed in the middle of a square surrounded by lean-to sheds which, being boarded up at the back, served as a wind-break. In any similar climate it is thought that this would be a satisfactory and economical arrangement, but it is too draughty for such a cold climate as that of Canada and the northern States.

The sulphur fumigation plant erected at Lachine was more elaborately finished than those originally erected in France. It proved entirely satisfactory for the treatment of lice and ringworm, provided that the animals were exposed for one hour to a concentration of sulphur fumes sufficiently high to extinguish a spirit lamp. After such an exposure it was found, by a carefully controlled test of over 600 badly infested animals, that even in their unclipped state, with extremely heavy coats, all lice and eggs were with certainty destroyed by one exposure. Equally good results were obtained in the comparatively few cases of widely disseminated ringworm treated by this method, but mild localised cases were treated by ordinary methods.

In the treatment of scabies no opportunity ever arose for the thorough trial of this system, as very few definite cases of mange were detected after the sulphur fumigation chambers came into operation. The majority of animals evince no great objection to going into the fumigation stalls and stand perfectly quiet during the treatment, but care should always be taken that each animal is provided with an extra strong leather head-stall, and is firmly secured by two ropes to a bar placed a sufficient distance in advance of the front of the stall, to obviate all possibility of the animal falling back into the sulphur fumes and being suffocated.

Disinfection of Depots.

It has already been stated that the work of disinfecting depots had been taken out of the hands of the contractors and allotted to a

special staff authorised for the purpose at each depot. This procedure was a great improvement on what had obtained previously, when the work was left to the contractor, who usually did not in the least understand its importance. The system in operation at that time was a system of spraying with a weak solution of some coal tar disinfectant similar to Jeyes' Fluid. This was sprayed on to the woodwork, mangers, etc., by means of a powerful spray, but except in the hospitals no attempt was made to cleanse thoroughly the woodwork before the spray was applied. The spraying was, therefore, almost useless. When the duty of disinfection was taken out of the hands of the contractor a system was introduced of scrubbing the mangers, hay-racks, water-troughs and all woodwork exposed to infection with a solution of caustic lye. This system, which originated on certain horse transports, proved most efficacious and satisfactory. By the regular use of caustic lye solution the whole of the woodwork can be kept clean and white, and it was found that when used in the proper strength no harm need be feared to the hands of the man using it. The strength recommended is one tablespoonful of lye to a gallon of warm water. This solution should be applied by means of swabs or a spray, and the woodwork should be thoroughly scrubbed with wire brushes and afterwards with deck-scrubbing brushes dipped in a disinfectant solution.

For the disinfection of stable and pen floors, quicklime was allowed during the last year at the rate of one pound a day for each animal, for application after the floors had been cleansed in the ordinary way. This helped considerably both to dry the floors and to destroy infective material. Quicklime was also extensively used with a view to destroying infective material in outside paddocks, but to attempt to disinfect thoroughly any ground which has been trodden into deep mud by a succession of animals is to attempt the impossible.

The most satisfactory system is for all animals to be kept under cover on hard floors capable of thorough disinfection and drainage at all times, and to allow them out in small open paddocks for fresh air and exercise only in fine weather when the ground is dry.

Transport by Rail.

The long distances travelled by rail by all animals purchased in Canada and America account partly, it is thought, for the greater virulence of the so-called "shipping fever" as compared with "dealer's fever" in England, though possibly both conditions are due to the same organism. Not only are the journeys very long, averaging twelve hundred miles from the point of purchase to the coast, but the conditions of travel are at times very trying, and the animals often travel long distances and pass through various dealers' hands before they are shown to our buyers.

The type of car used is a long one, capable of holding from eighteen to twenty animals, with a closed top and open rail sides.

These sides in winter time are closed entirely by "slatting up" with thin boards the intervals between the rails; but whatever care is taken, such cars are objectionable. In the winter they are draughty, and yet may be stuffy unless care is taken to leave out sufficient slats at the top to provide ventilation. At all seasons animals are liable to be in a overheated condition on coming out of any form of car, and require careful handling.

The law, both in Canada and the United States, enacts that, under normal conditions, no animal may be more than twenty-eight hours on a train without being off-loaded to feed, rest and water. This is a very necessary law; and, though under war conditions the time was extended to a maximum of thirty-six hours, it is best not to allow longer intervals than thirty hours. The great majority of animals will not eat in the cars, and it is impossible to arrange for them to be watered satisfactorily without off-loading. They become very thirsty and empty, besides being exhausted by the journey itself, and are consequently more susceptible to disease. If, as not infrequently happens in the winter, a train is delayed many hours, or even days, by snow drifts in a place where there are no facilities for watering and feeding, serious sickness and loss of life may occur.

Both the American army authorities and the British Remount Commission had experience of considerable numbers of animals dying in trains shortly after arrival at destination. In one instance, where the American army lost over 50 per cent. of one train-load, the deaths were by popular consent attributed to poisoning by an enemy agent. The veterinary officer who investigated the matter stated, however, that there was never any evidence of poisoning, and nothing of a suspicious nature was found on analysis of the stomach contents. In his opinion the deaths were the result of the long time the animals had been in the train without food or water, viz., seventy-two hours. This opinion coincides with the experience of the commission, and some light was thrown on the matter from certain observations carried out by Captain Graham, of the United States Army Veterinary Corps, to elucidate a rapidly fatal condition in horses and mules brought into Atlanta, which always followed immediately after the arrival of animals from a long railway journey.

During November and December, 1917, fifty deaths had occurred in the stockyards at that city, and 50 per cent. of three train-loads received from St. Louis, Kansas City, and Nashville had died. The symptoms observed were those of acute intoxication. Animals which appeared healthy in the morning might be dead by night, and a striking feature was the fact that the condition never developed after forty-eight hours from the time of off-loading from the railway cars. Treatment of all kinds appeared to be useless. Some of the animals suffered from diarrhoea an hour or two before death, but to the ordinary observer nothing was noticeable beyond the fatigue following the journey.

With clinical experience, however, it was found that the character of the pulse was pathognomonic, being so weak as to be almost imperceptible. The temperature varied from 102° to 105° F., the ears and lips were cold, gums and lips blue, and the conjunctiva very livid in colour. Death occurred from cardiac arrest, usually when the animal was in a standing position.

Post-mortem examination revealed general changes suggestive of septic intoxication, but there were no specific gross pathological lesions. In some cases enteritis involving the caecum or colon was found, and the spleen was usually greatly enlarged, pulpy, dark and soft. The enteric lesions were not always present, and were not then regarded as characteristic of the disease, though the clinical picture suggested a per-acute enteritis accompanied by septic infection. In experiments on mules, the characteristic disease was said to have been induced by feeding a broth-culture of a bacillus, isolated from the spleen of a spontaneous case, which appeared to be of the para-typhoid-enteritidis group.

The above information regarding these experiments was supplied by the veterinary officer who was at Atlanta at the time the observations were being carried on, though it is doubtful if the para-typhoid organism mentioned can be accepted as the specific cause of the condition. Dr. Mohler, Chief of the United States Bureau of Animal Industry, stated that he had been well aware for a number of years that such effects were liable to follow long periods in the train without food and water, having himself investigated a number of cases which had occurred in the course of ordinary civilian traffic several years before the war. In his opinion the cause of death was an acute intoxication due to the rapid development of organisms in the empty bowels under the adverse conditions described.

It was said that deaths from this cause were frequent before the introduction of the present law requiring all animals to be off-loaded at stated periods to water and feed. Heavy loss from this cause among the remounts was never reported, but it seems clear that a considerable number of deaths ascribed to the enteric form of "shipping fever" were due to this cause, particularly during the spring of 1918, when railway travelling was so disorganized that animals took as long as eleven days to complete a journey which should normally only occupy about thirty hours, and when it was often impossible to arrange for them to be off-loaded, watered and fed at proper intervals. Twenty-four mules died at Newport News shortly after they had been off-loaded from a train which had been delayed eighteen hours on a journey which should have been completed within the prescribed period of thirty-six hours. The animals dropped dead in the pens in exactly the manner described above, and a successful claim was put forward against the railway company whose employees had refused to allow the conductor to water and feed while the train was at a standstill.

Judging from the number of cases which always occurred after a long period without food or water, it is evident that any period

much in excess of thirty-six hours without detraining to water and feed may be responsible for heavy mortality; and, in order to be on the safe side, thirty hours without off-loading should be the maximum period allowed.

Inspection of Cars.

Before animals are placed in cars provided by the railway company it is very necessary that each car should be carefully inspected for cleanliness, and for projecting nails which are likely to work loose during a journey and may cause severe laceration. Each car is required by law to be disinfected by the railway companies after each journey, but this is not always thoroughly done. Sand and ashes were placed on the floors to give a foothold and a straw bed was provided by the commission.

The cars vary in type on different railways, but the principle is the same throughout America for ordinary stock cars. Race-horses and other valuable animals travel in what are called palace cars, and at one time the question was considered of using these for remounts, but it was ascertained that these cars could only be obtained in small numbers. Had a sufficient number been available for running the animals straight through daily from each purchasing point to their destination, the extra expense would probably have been justified.

Feeding in Trains.

The system of feeding during transit by rail adopted almost universally on the American continent is to give the animals about 10 lb. of hay each day before starting and to place about 15 lb. each in the cars, but much of this is not eaten and the animals arrive in a very empty condition. It has been said that to give grain shortly before a train journey is likely to produce colic, but during a long period, on veterinary recommendation, a feed of oats was given to the animals leaving Chicago and Toronto without any sign of colic ensuing, and it was found that they travelled better than when hay only was allowed.

Railway Feeding Stations.

As mentioned above, the law, both in Canada and the United States, requires all animals travelling by rail to be detrained after a definite period in the cars, to be rested, fed and watered. The usual time allowed for this is five hours, but an endeavour was always made to extend this to at least twelve hours, particularly after the system was adopted of taking all temperatures before despatch. To comply with this law it is necessary to arrange for feeding stations at the necessary intervals along the railway, and, as a number of sick always have to be kept back out of each train-load, hospital accommodation is necessary for from 50 to 100 animals at each station, the number depending on the extent to which the line is expected to be used.

The pens at a feeding station should be similar to those recommended for remount depots, viz. :

Moderate size, covered pens with plenty of provision for ventilation and light under the eaves, but no draughts. A good straw bed should be ready for the animals to lie down on immediately they arrive, and fresh water should be in the troughs at all times. Owing to the constant flow of freshly purchased animals through these feeding stations, particular care is necessary to ensure thorough disinfection of the entire premises, and provision should be made for the isolation of special cases.

Embarkation Duties.

The selection of animals for embarkation at shipping depots is a matter requiring care and practical experience above everything, and it was found that the veterinary officers who were doing this work had learned by long experience to detect with great facility when an animal was fit for shipment. No change was therefore considered necessary, with the exception that arrangements were made for the taking of temperatures at depots in the course of the final examination of "shippers" prior to their despatch to the docks.

It was, however, necessary to place the organization of the veterinary embarkation service on a more definite basis as regards the examination of forage ; the inspection of the ship and animals at the wharf by the embarkation veterinary officer and conducting officer immediately before embarkation ; the supply of drugs and the issue of the necessary instructions. A form of embarkation veterinary officer's report was drawn up, and detailed instructions were issued to the E.V.O.s responsible for these duties ; a record of all necessary information regarding each ship being kept in the D.D.V.S.'s office in addition to a card index of all conductors. On the arrival of Major Pawlett, A.V.C. (T.F.) from England, all embarkation duties were placed directly under his supervision, including the provision of conducting officers, and, in addition to his other duties as personal assistant of the D.D.V.S. he carried out those of embarkation veterinary officer at the port of Montreal from that time forward.

Shipping results during the year show that these duties and those of conducting officers were satisfactorily performed, but there is little doubt that results at sea are influenced more by the care with which the animals are prepared and finally selected for shipment in depots than by anything which can be done subsequently. Experience has shown that animals which have been through their sickness, and which are thriving at the time of embarkation, seldom come to any serious harm on board ship. On the other hand, if animals have to be shipped which for any reason have not had time to recover completely from the effects of the railway journey to their shipping depot and the sickness which usually follows these journeys, trouble is likely to arise however much care the conductor may take while at sea. For this reason it is essential that arrangements should be made to retain horses in the depots for an average period of at least six weeks prior to embarkation, and mules not less than

one month. It is not intended to convey the impression that the duties of a conducting officer are unimportant, or that some conductors are not better than others; but conductors themselves thoroughly recognize that animals which have been through hospital are less liable to become ill at sea than better looking animals which may have escaped sickness on land.

An important factor in the prevention of disease is the degree of thoroughness with which the ship is disinfected before the animals are placed on board, and it was frequently necessary to get this work done again before boats could be passed as fit to embark animals. An endeavour was made to arrange that the conducting officer and sufficient of his men should be sent back to Canada in each ship to carry out this duty by scrubbing the whole woodwork with a solution of caustic lye and wire brushes on the way out. It was, however, often found impossible to arrange this, for various reasons connected with shipping.

Forage.

1. *Hay*.—The hays available for feeding in the middle-west and eastern sections of Canada and the United States are:—

- (1) Timothy hay, composed entirely of timothy grass (*Phleum pratense*).
- (2) Timothy and clover (*Trifolium pratense*) mixture.
- (3) Prairie hay, varying in composition in different districts but composed mainly of Red Top (*Agrostis alba*); Orchard Grass (*Dactylis Glomerata*); Meadow Fescue (*Festuca Elatior*).
- (4) Alfalfa hay (*Medicago sativa*).
- (5) Johnson grass hay (*Andropogon halapensis*).
- (6) March hay (*Calamagrostis Canadensis*).

Of these, *Timothy* is generally considered the best food for horses, and this was always obtained for the remounts wherever possible. It is very extensively grown in Canada, and in the United States the area under this grass is as great as that under all the others put together; but the greatest available supply is in Canada, and it was often necessary to arrange for our depots in the States to be supplied from this source. The Timothy hay is somewhat coarse and lacking in aroma compared with the best English hay, but is usually well saved and makes a very satisfactory feed.

Alfalfa Hay is much grown in the semi-arid regions of the western states. It is well saved and much used in the south, but care is necessary in giving it in large quantities as its tendency is to cause looseness of the bowels. This hay was not therefore much used by the commission, except at Ogden, Utah. Broken and mixed with molasses as a laxative it was found to be a satisfactory substitute for bran.

Johnson Grass Hay is very coarse looking, with a colour and aroma of its own reminiscent of marsh-grass, but it analyses well and is extensively used in the south with apparently satisfactory results.

It was only used for remounts very occasionally when other hay was not obtainable, and appears to have given satisfaction.

Timothy and Clover Mixture is much grown in the northern two-thirds of the United States and is a very satisfactory feed which was used largely for the animals at Chicago. Pure clover hay, or a mixture with a high proportion of clover, was not considered suitable in the circumstances, on account of its high nitrogenous ratio.

Marsh Hay, cut on the marshy lands of the eastern States, is sometimes offered, but on account of the danger of parasitic infection the use of this was forbidden. If composed mainly of *Calamagrostis Canadensis* it is said to have good feeding value.

2. *Oats*.—The oats obtainable in the States are thin and poor-looking compared with English oats, and do not weigh on the average more than 34 to 36 lb. to the bushel, partly because many of them have a loose husk which prevents the grains from packing closely in the measure. Their value as a feed is, however, better than their appearance would suggest, and animals do well on them.

Canadian oats, on the other hand, are very good, weighing as high as 44 lb. to the bushel. Black oats are seldom met with and our own animals were fed almost entirely on the white variety.

3. *Bran*.—The only bran obtainable in America and Canada is the fine roller-mill bran to which we have become accustomed in England during recent years. The feeding value of this bran is probably not high, though recent feeding experiments in England appear to show that it is better than has generally been supposed. During the last year of the war, however, bran was so much in demand for other purposes that it was seldom obtainable for our use. There was never any evidence to show that the animals suffered harm on this account, and this bears out the view that too much stress is apt to be laid on the necessity of bran for animals such as remounts which are not receiving a very high grain ration, and therefore do not require a laxative in the same way as animals which are worked hard and very highly fed.

4. Indian corn, usually called "corn" in America, is obtainable everywhere and is almost exclusively used in the south for mules. As, however, the mules get no Indian corn in France, it was thought advisable to get them accustomed to oats before embarkation, and no Indian corn was used after the summer of 1917. It is usually broken slightly before being given, and mixed with a proportion of bran.

5. Linseed of good quality is obtainable in most places.

6. Green stuff for sick horses was always hard to obtain. Roots, such as carrots and mangels, were also not often obtainable.

Rations.

At one time the standard ration for the horses was:—

Oats	..	..	..	7 lb.
Indian corn	..	..	..	3 lb.
Bran	..	..	..	5 lb.
Hay	..	..	..	20 lb.

but later, on veterinary recommendation, it was fixed at :—

Oats	..	..	..	9 lb.
Bran	..	..	..	2 lb.
Hay	..	..	..	18 lb.

with a slight reduction in the proportion of grain in the summer and a slight increase during zero weather.

This ration was made variable by the use of equivalents of equal market value, and appears to be a satisfactory standard ration for remounts. Anything less has been found too small, with the result that animals eat up any woodwork within their reach.

The mule ration was at the same time fixed at :—

Oats	..	..	..	8 lb.
Bran	..	..	..	2 lb.
Hay	..	..	..	14 lb.

Previously it was fixed at :—

Corn	..	..	..	4 lb.
Oats	..	..	..	5 lb.
Bran	..	..	..	5 lb.
Hay	..	..	..	18 lb.

Reserve of Animals.

An important consideration in remount operations of this kind is the size of the reserve which it is necessary to maintain in order to give the animals time to recover from their sickness before embarkation. Experience proved that the majority pass through some form of fever within the first three weeks after their railway journey to the coast and, at the best, a period of from three weeks to a month after this is necessary before horses are fit to be shipped, while a number develop pneumonia or other complications and require a still longer period for convalescence.

It is difficult to calculate exactly how long the animals were kept in depots ; but on the system adopted they should get through to the shipping depot within ten days of purchase. It may be assumed that the average period before horses are fit to be shipped is from four to six weeks after arrival at a shipping depot, while mules require about four weeks. Allowing therefore a margin for emergencies, and for feeding stations usually being more or less empty, the total accommodation available should be enough to provide cover for the normal number of animals purchased during two months.

If the reserve is not maintained at this level, or if in consequence of sufficient accommodation not being available the depots become overcrowded, the evil effects are noticeable, both on land and sea, and the animals arrive in England in such an unsatisfactory state as to be unfit for service for a long time. This was clearly shown to be the case during the early days of the commission, and no consideration should be permitted to interfere with the maintenance of such a reserve.

Casting Unsound Animals.

There was at first no system by which unsound animals were regularly inspected and cast for sale or destruction. In consequence of this an accumulation took place of unsound animals, which were eventually cast in October, November and December, 1915, by a remount officer and sold in large numbers.

Later on, inspections of animals proposed for casting were regularly carried out by veterinary officers, and sales were held at frequent intervals under instructions from the D.D.V.S., while in March and April, 1918, and on the final closing down, large numbers were cast and sold at reject sales, many of which in the ordinary circumstances would have been considered fit to be shipped.

Consequently, the conditions on account of which animals were cast varied a great deal, and no exact comparison between different periods is possible. The percentage cast from year to year remained, however, much the same, i.e. 1·2 per cent., and the main causes of casting over the whole period were as follows:—

Paraplegia	..	..	18	per cent. of total number cast.				
Roarers	..	..	15	"	"	"	"	"
Fistula (withers)	..	..	8	"	"	"	"	"
Broken wind	..	..	7	"	"	"	"	"
Quittors	..	..	6·1	"	"	"	"	"
Defective vision	..	..	3·1	"	"	"	"	"

During the last eighteen months of the war, however, 40 per cent. of the total castings were roarers cast on reduction of establishment, the majority of which were slight and would not have been cast at all in ordinary circumstances. The percentage of casting for this condition would therefore be less than 15 per cent. under normal conditions.

The number cast on account of broken wind and quittor decreased latterly, the quittors having been mainly due to gangrenous dermatitis, and the broken wind, it is thought, partly to improper feeding.

Supply of Instruments and Appliances.

Instruments and veterinary appliances were purchased locally as required and, though the amount expended was not great, the veterinary hospitals were latterly fairly equipped for all ordinary purposes.

For serum inoculation the 100 c.c. syringes supplied for the administration of hog cholera serum were mainly used and were found satisfactory for the purpose, though a syringe capable of holding 200 c.c. would be preferable for intravenous inoculation.

Shoeing.

The shoeing of the horses in depots and prior to shipment was always a difficult matter to arrange satisfactorily. In consequence of the war the majority of the civilian shoeing-smiths ordinarily available had left, and those who remained were often unfit for

hard work and were incompetent. Whole-time men were as a rule unobtainable, and the work had to be done entirely under contract, with the exception that latterly six army shoeing-smiths were sent out from England. Four of these men were thoroughly good tradesmen and of the greatest value in the hospitals to which they were attached. There are always a number of foot cases requiring the attention of a farrier in addition to a large amount of shoeing, and it is strongly recommended that in future operations a certain number of shoeing-smiths should be provided from military sources.

Under the conditions of purchase all animals had to be shown without shoes, but flat shoes without calkins were tacked on to the fore feet before the animals were despatched by rail. In depots where the floors admitted of this, shoes were left off as much as possible, but where the soil was stony all animals were kept shod up in front continuously and the hind feet trimmed. Everywhere, if possible, arrangements were made for them to be re-shod in front immediately before despatch to England. Owing, however, to the short notice sometimes given to load a ship and the shortage of suitable men this was not always possible.

Respiratory Diseases.

Shipping Fever and Pneumonia.—By far the most important source of loss, both in horses and mules, but infinitely more so in the former than in the latter, was pneumonia following the condition which in this country is appropriately called "shipping fever," the word "shipping" being used, as universally in America, to mean movement by train.

In the past this form of pneumonia has probably been responsible for at least three or four times as much mortality as all other causes added together, and at certain times the disproportion has been even greater. The original type of pneumonia in all cases appears to be a catarrhal or lobular one, but large septic or gangrenous areas occur in the later stages, due to various pus organisms, which are, it is thought, usually secondary; pleurisy is a very common complication.

The work carried out during the last eighteen months at Newport News by Dr. Gregory makes it clear that in the early stages of "shipping fever" a bacillus is present in the blood stream in the majority of cases, usually in pure culture which closely resembles the bacillus "X" described in Lieut.-Colonel Watkins-Pitchford's pamphlet, "Enquiry into the Horse Disease known as Septic or Contagious Pneumonia."*

This organism, either alone or associated with streptococci or staphylococci, was recovered by Dr. Gregory from the blood stream in 60 per cent. of fifty-four pneumonia cases examined, and 47 per cent. of forty cases of catarrhal fever examined.

Whether the organisms found in America and England are identical it is at present impossible to say. In cultural and biological

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respects they apparently are, but the effects of shipping fever in America differ to some extent from those met with in dealer's fever in England, though possibly only in degree.

Animals which have just recovered from shipping fever or pneumonia show a definite agglutination reaction to bacillus "X," and this reaction can be enormously strengthened by hyper-immunization with pure cultures of this bacillus. Injections of its toxin in moderately large doses produce symptoms closely resembling those which occur at the first onset of an acute case of pneumonia following shipping fever, and if the dose is large enough the animals show all the symptoms of an acute intoxication, with collapse. It does not appear to be easy to produce general infection by injections of this organism into a healthy animal, but local lesions, such as acute tendonitis, are very liable to follow an intravenous injection of bacillus "X" in pure culture, or of a large dose of its filtered toxin alone.

Whether pure cultures or the toxins only are used in these inoculations, either bacillus "X" or micrococci, or both, may be recovered from the lesion produced. Very large doses of streptococci and staphylococci, on the other hand, were given repeatedly without ever inducing any pathogenic condition, or any effects beyond a slight rise of temperature.

These observations tend to show that the original symptoms of shipping fever are due to intoxication with the toxins of bacillus "X," which probably invades the blood stream in consequence of the reduction of vitality produced by the various adverse circumstances associated with change of ownership.

If the blood stream is examined early in shipping fever, bacillus "X" is found in pure culture more frequently than in the later stages, when it is more frequently found associated with streptococci or staphylococci of varying types. In a certain proportion of cases streptococci and staphylococci only are found, and, in a few, other organisms may be the only ones present.

The pneumonia following shipping fever does not appear to be highly contagious* from animal to animal. Though the majority of all the horses purchased in America develop shipping fever in some form, this disease varies much in intensity, due apparently to the variation in the conditions to which the animals have been exposed; their state of health; the extent to which they have been exposed to infection; and, possibly, to variation in virulence of the organism responsible. It seems probable that the causal organism is constantly present, either in the respiratory passages of the animals, or in infected depots, and that only such debilitating circumstances as long train journeys or severe chills are necessary to enable it to gain a footing in the blood stream.

A few observations were carried out with a view to determining whether bacillus "X" could be recovered from the soil of infected

* Watkins-Pitchford found that the similar condition in England was not contagious.

paddocks, but the isolation of any particular organism in these circumstances is a difficult matter, and nothing definite ever came of these observations.

Reduction of vitality from any cause appears to be a most important factor in producing this form of pneumonia, and it is thought that one of the reasons for the marked superiority of the system in operation, since May, 1918, over the previous one was that the animals carried out their long train journeys before they had lost the health and vitality produced by regular work, or life in the open, immediately before purchase. Such a loss of vitality unavoidably occurred when the animals were congregated in large numbers in more or less insanitary depots for a considerable time before being sent to the coast.

Many cases that developed fever or pneumonia in these depots were liable to develop a second attack after the train journey to a shipping depot, and it is quite a fallacy to imagine that the immunity conferred by one attack of shipping fever is absolute, or by any means permanent. The immunity does not appear to be strong enough to be of much value after from six to eight months, and may break down at any time if circumstances are exceptionally unfavourable. In heavily infected and insanitary depots, such as Lathrop and Calumet, it is considered that much pneumonia was caused for which previous infection, or the effects of travel by rail, could not in any way be held responsible. In such depots it seemed to be a question of direct infection, due to the grossly insanitary conditions which unavoidably arose when large numbers of animals were congregated in them.

The following are the principles which were practised and are recommended for adoption in any similar operation in America in the future, with a view to preventing shipping fever and the resultant pneumonia and other complications :—

- (1) The temperatures of all horses should be taken immediately before purchase, and all rejected which have a temperature of 102° F. or over, a watch being kept for tricks such as packing the rectum with ice to modify the temperature artificially.
- (2) The animals should all be concentrated in sanitary accommodation at the earliest possible moment after purchase, and sent through to shipping depots as soon as train-loads can be made up.
- (3) Thirty hours should be the maximum period between stops to off-load and feed during journeys by rail.
- (4) Temperatures should be taken again before despatch from every point where the animals have been detained.
- (5) On arrival at a depot the animals should be at once placed in moderate sized (45 ft. by 45 ft.), covered and well-lighted pens, and should be carefully inspected and their temperatures taken daily so long as fresh cases continue to occur.

- (6) Water, preferably running, should always be in front of the animals, and they should be allowed a moderate supply of oats and bran and sufficient hay to fill their stomachs. It is a mistake to withhold water from animals just off a train, even if they are sweating, as often happens, and it is thought that the custom so prevalent on the American continent of allowing unlimited hay is harmful. A liberal ration of hay should, however, be given on arrival after a train journey, because little is usually eaten in the cars and the animals become very empty in consequence.
- (7) No exercise, beyond what the animals themselves take in the pens, should be allowed during the first three weeks, and the greatest care should be taken to prevent any excitement or bustling during that period. The temperatures of the great majority can be quite easily taken in the pens without passing the animals through a chute; and if an animal is very fidgety, or its temperature cannot be taken without exciting it unduly, this should be omitted, reliance being placed on careful observation to detect the first onset of sickness. Passing animals through a chute, like all other kinds of hustling, rough usage, or exercise, is apt to induce pneumonia in a case which would otherwise probably remain throughout a case of simple fever.
- (8) The strictest attention should be paid to the cleanliness and disinfection of all accommodation. The free use of quick-lime (1 lb. a day for each animal) on stable and pen floors is very useful in this connection and in drying the floors, but lime-wash should be forbidden on all woodwork, and a regular system of scrubbing all woodwork, mangers, troughs, etc., with wire brushes and a caustic lye solution (1 tablespoonful to 1 gallon of hot water) should be adopted at all depots. By this means the woodwork can be kept perfectly clean and, used in the above strength, no damage should occur to the hands of the men using the lye.
- (9) All animals having a temperature of 102° F. or over should be at once placed in well-lighted stables, with ample air space and ventilation, and provided with a good straw bed and fresh water.
- (10) Immediately on admission, every animal suffering from fever should be given an intravenous injection of 200 c.c. of serum "P," care being of course taken to ensure that the point of the needle remains in the lumen of the vein throughout the injection; that the inoculation area is carefully disinfected; and that all instruments are sterile.
Further doses of serum "P," usually 100 c.c. at a time subcutaneously, may be given during the seven days following the initial dose as required, but no more

serum must be given after that, or fatal anaphylaxis is liable to occur. In giving serum subcutaneously, care should be taken not to inject two doses at or close to the same spot, as this increases the liability to abscess formation. The exact time when danger from anaphylaxis supervenes has not been determined, but experience of very large numbers prove that there is no danger within eight days of the initial dose.

- (11) Paracentesis thoracis should be at once performed on any animal showing well-marked signs of pneumonia or pleurisy, and this may be repeated without danger if considered necessary.
- (12) Other forms of treatment may consist in bleeding lightly where the condition of the pulse makes this advisable, and the infusion of saline solution, with soluble iodine added if the blood is very thick and tarry. The administration of small quantities of potassium chromate and salines in the water is apparently also beneficial.

Good nursing, light grooming, and sufficient clothing are of course necessary, but the animals should be very quietly handled at all times and disturbed as little as possible.

If the animal is very nervous or fidgety, some of the above treatment may be omitted with advantage; but serum should be given in all cases and, like other sera, the initial dose should be given at the earliest possible moment after the first onset of fever. If serum is not given until the disease is well established marked results must not be expected; but one carefully controlled trial of a number of cases treated with serum, although not at the earliest possible moment, showed that the results from serum were still superior to other forms of treatment, in mortality, the length of time in hospital, condition on discharge, and incidence of complications.

The value of these observations was, however, somewhat marred by the fact that at the latter part of the experiment, when the largest number of cases was under treatment, a severe outbreak of pink-eye occurred. Moreover, during this trial only 13 per cent. of the total number of animals received at the depot were given serum treatment, whereas if temperatures had been taken and all cases of fever placed under treatment at once the experience at other depots shows that this proportion would probably have been as high as 50 per cent. or over.

As regards other forms of treatment, bleeding and the infusion of saline solution often appear to have a very beneficial effect on a case in which the pulse rate is high and the circulation embarrassed. A rapid fall in pulse rate within an hour or two of the bleeding often occurs with manifest relief to the animal.

Paracentesis thoracis also seems to have a beneficial effect, even though the amount of fluid drawn off may be very small. One officer reported that out of 229 cases in which he had performed

this operation, fluid had been obtained in forty-five instances. In the majority the amount of fluid obtained was small, varying from half an ounce to one pint, but in nine cases the amount was large, varying from 3 to 38 quarts. Of these nine animals, three died, but some from which as much as $15\frac{1}{2}$ to 14 quarts had been drawn recovered.

On post-mortem examination all stages of pneumonia are found, including areas of congestion and red and grey hepatization, usually affecting the lower border and anterior lobes of the lungs. Large areas of lung may be involved without any affection of the pleura, but a sero-fibrinous deposit is commonly met with on the surface of the pleura, sometimes as much as an inch or more in thickness. This is usually gelatinous and straw coloured, but may be firmer in consistence, and is almost invariably associated with more or less fluid in the pleural cavity.

Abscess formation and gangrene of the lung tissue are common but appear to be a secondary development of the disease. Pronounced cloudy swelling of the liver and kidneys, associated with petechiae under the endocardium, is usually found, and in some cases the alimentary tract is also affected, particularly the large colon, which may also be covered with petechiae.

Variation in the Mortality due to difference of type and locality in which purchased.

After May, 1918, the animals from various purchasing points were mixed in Chicago and despatched in train-loads to the different depots as required. The animals from all centres therefore had an equal chance as regards treatment and conditions after despatch from the purchasing point, and it has been possible to make an exact comparison as to mortality between the horses bought at the different centres.

It was observed that, both in the total and class by class, the animals purchased in certain centres were much healthier than others, while the mortality among heavies and extra heavies was always greater than among the artillery class, and the death rate among the latter class was always greater than among cavalry horses.

The worst centres were Cedar Rapids and Chicago, and the best were Ogden and Sioux City, while St. Paul was about half way between. The reason for this was, it was thought, that the animals bought at the first two centres were almost entirely of the pampered "barn-fed" type, and those bought at Ogden and Sioux City were animals which have been bred on open ranges, while at St. Paul both classes were met with.

It is interesting to note also that the mortality among the artillery class bought at Ogden and Sioux City was only a little more than that among the cavalry class bought at the same centres. This fact appears to be contrary to the generally accepted belief that the heavier the class the heavier will be the mortality, and the

reason may be that practically all of both the cavalry and the artillery class bought at Ogden and Sioux City were range animals, while at other purchasing centres practically all the heavies and the majority of the artillery class were "barn-fed" and only the cavalry and a few of the artillery were "range" animals.

These views as to the cause of this difference in mortality are further supported by an experience which occurred latterly in shipping a number of pure bred Percheron mares to England, and a number of jack donkeys to India. The former, though heavy animals and fat, had all been running out on open range country in the foothills right up to the moment of shipment to Montreal, and the amount of sickness among them was almost nil, with no deaths. The donkeys on the other hand, though naturally less susceptible, were pampered animals which were said to have been fattened up for sale in close stables, and the amount of sickness and mortality among them was very high indeed.

The class of the animal no doubt has considerable influence, but these figures rather point to the general conditions in which it had been living, sanitary conditions particularly having an even greater effect on sickness and mortality. Unfortunately, to obtain the number of heavy horses required it was necessary to buy animals of the pampered type in spite of this heavy mortality. Instructions were, however, issued to purchasing officers to the effect that very fat, gross animals should not be accepted. Instructions were also issued latterly that such animals should receive a dose of laxative medicine in a mash before entrainment.

Provided that the animals are healthy to start with, the actual length of a train journey, carried out under satisfactory conditions, does not appear to have much effect. The Percheron mares referred to above, and the Ogden animals, had the longest journey of all to reach their shipping depots and yet the sickness and mortality among them were less than among the animals purchased at any other centre.

As time went on the amount of sickness and mortality occurring among the Ogden animals was steadily and, towards the end, rapidly mounting. This was, it is thought, due to the open sandy pens in which the animals were accommodated becoming more and more infected as more animals passed through them, so that, though still bought from range country, the Ogden animals would soon have been in the same position as barn-fed animals as regards having been in contact with contagion prior to entrainment.

Serum and Defibrinated Blood.

In the earlier days of the commission a good deal of work had been done by Captain James Gregg, then at Newport News, in the treatment of pneumonia by means of defibrinated blood obtained from animals which had made a good recovery from pneumonia and had been hyper-immunized subsequently with blood drawn from other animals in the acute stages of that disease. There

had been a great deal of controversy as to the merits of this treatment, but a careful study of the statistics at a later date, when there was time to get these out from past records, clearly showed that whatever the case Captain Gregg had been strikingly successful in reducing mortality at Newport News from the time when, in July, 1916, he took over the duties of senior veterinary officer at that depot. Prior to that date the mortality at Newport News had been at the rate of 2·8 per cent. of all horses received, which compared unfavourably with the figures for the other three main shipping depots, in which the mortality averaged about 2·5 per cent. From the time that Captain Gregg took over at Newport News, however, the mortality at that depot had fallen below 1 per cent., while at the other three depots it had risen to an average of 3·5 per cent. As the number of animals handled at Newport News with this very small loss of 1 per cent. amounted to 40,000 horses, and as the horses handled at all the four depots concerned were received from as nearly as possible the same source and under similar conditions, it was clear that some reason must exist for the dramatic reduction in mortality which had taken place at Newport News compared with what had occurred previously at that depot and was still occurring at the other three depots.

Captain Gregg himself attributed these results to the system of treatment with defibrinated blood, which he had employed originally at Lathrop, and later, with the assistance of Dr. Gregory, at Newport News, where a small laboratory had been established for the purpose. This treatment, in his hands, had given no trouble and certainly appeared to have reduced mortality in a very striking way. Various attempts had, however, been made to utilize this treatment elsewhere by sending defibrinated blood and, latterly, immunized animals to other depots, but the results had been disappointing, and in June, 1917, the laboratory at Newport News was closed, and Dr. Gregory was employed on ordinary depot duty at Grand Island.

Newport News, at that time, was only being used for a comparatively small number of mules and had practically no horses, so that there was little scope for Captain Gregg's defibrinated blood treatment. As, however, high mortality was taking place at some of the purchasing points and depots in the middle west, it was decided to send Captain Gregg to these depots in turn, so that he could carry out his system of treatment himself, and at the same time start an organization for this treatment at each depot and train the veterinary officers in the technique. This was accordingly arranged, and Captain Gregg was thus employed at various depots from the beginning of September, 1917, to the end of January, 1918, when he returned to Newport News.

That he reduced mortality at the centres where he was thus employed is, it is thought, clear, but experience proved that it was impossible to send defibrinated blood any great distance for use at other depots, and even in Captain Gregg's own hands his system

was liable to cause a considerable number of abscesses where the facilities of a laboratory were not at his disposal, in consequence of the repeated injections of defibrinated blood involved in the treatment. Though these abscesses were as a rule of no importance, some of them caused considerable sloughing and required a long period of convalescence, while there was always a danger that generalized infection with pus organisms might occur. Where conditions were insanitary, at such depots as Calumet, danger of this was considerable, and it was therefore decided in December, 1918, to discontinue the use of fibrinated blood treatment altogether and to test instead serum "P," which in the meantime had been prepared and tested on a small scale at Newport News laboratory.

Dr. Gregory, during October, 1917, reported that he had succeeded in recovering from the blood stream of animals suffering from pneumonia a bacillus which appeared to be the same as that described by Lieut.-Colonel Watkins-Pitchford, and called by him bacillus "X." He was therefore asked to proceed to hyper-immunize animals with this organism with a view to producing a sterile, immune serum, which could be sent to other depots for use in the prevention and treatment of pneumonia. This he did, and after the serum had been tested on a small scale locally with satisfactory results, it was put up in larger quantities, and arrangements were made for it to be tested on a large scale at purchasing points as a preventive.

At first three sera were prepared, viz.: Serum "P," serum "X," and serum "G."

Serum "P" was made by hyper-immunizing animals with gradually increasing doses of pure cultures of various strains of bacillus "X" and of streptococci and staphylococci recovered from the bloodstream and tendon sheaths of animals suffering from pneumonia and tendonitis.

Serum "X" was prepared by hyper-immunizing with bacillus "X" only, and *serum "G"* with streptococci and staphylococci only.

Of these three sera, serum "P" gave the best results when tested. Serum "G" gave practically no results at all, while serum "X," although it undoubtedly had protective power, did not appear to be so satisfactory as serum "P." The production of serum "X" and serum "G" was therefore finally abandoned, and only serum "P" was produced subsequently to the spring of 1918.

The method of production of serum "P" is as follows:—

It is a polyvalent serum prepared by hyper-immunizing animals (horses and mules) which have recovered from shipping fever or pneumonia.

The animals selected for serum production were usually animals which suffered from some disability, which either rendered them permanently unfit for military service or necessitated a long period of convalescence. The type most suitable for serum production was found by experience, and later by the agglutination test, to be a

robust animal which had come through its sickness without complications and rapidly recovered its vitality. The animals selected were hyper-immunized by the intravenous injection of pure cultures of mixed strains of bacillus "X," originally recovered from the bloodstream or infected tendon sheaths of animals suffering from pneumonia or tendonitis.

Before the process of hyper-immunization was begun the animal's blood was tested for the agglutination reaction by the microscopic method, and only those animals which gave a reaction to bacillus "X" in a dilution of 1 to 320 were used for serum production. Gradually increasing doses of pure cultures of bacillus "X" were then given daily until the thermal and systemic reaction which always follows these injections had ceased, usually after four or five doses given at intervals of three days.

A week later pure cultures of various strains of streptococci and staphylococci were given intravenously. Another course of bacillus "X" injections was then given, and these were again followed by cultures of streptococci and staphylococci. This process was repeated until the agglutination to bacillus "X" was raised to a dilution of one to ten thousand or over, usually after about three months. At the end of that time a good serum animal gave an agglutination reaction in a dilution of between one to ten thousand and one to twenty-five thousand. Trial bleedings were made from time to time, and the animal was considered to be sufficiently hyper-immunized when the index was as high as one to ten thousand.

To streptococci and staphylococci no agglutination reaction could ever be detected.

When satisfactorily hyper-immunized, serum animals were bled to the extent of two gallons at a time at three consecutive bleedings, at intervals of from one to two weeks. After this they were allowed to rest for a period of six weeks before being again hyper-immunized in order to maintain the agglutination index, which was liable to fall below the required standard after three or four bleedings.

Bleeding was carried out under the usual strict antiseptic precautions. All instruments and appliances were carefully sterilized in the autoclave for thirty minutes under a pressure of 15 lb.; the whole side of the neck, head and shoulder was disinfected, and a cord applied to the neck so as to distend the jugular vein. The skin was then incised, and a sharp pointed sterile canula passed upwards into the vein. The blood was drawn through rubber tubing into long glass beakers with a capacity of two litres each.

When nearly full the beakers were plugged and placed in a warm chamber at, or just below, 30° C. for six hours, and then in a refrigerator for twenty-four hours. At the end of this time sterilized weights, attached to the beaker plugs previous to sterilization, were released to press out the serum, which was siphoned off twenty-four hours later. By this method an average yield of about 75 per cent. of clear serum was obtained.

The serum was put up for use in sterilized bottles and was siphoned into these in a specially constructed bottling room, with a glass canopy to prevent large air currents from contaminating the serum with dust. The mouth of the bottle was further protected by an inverted glass funnel attached to the filling tube, and as a further precaution, from the month of March onwards, all serum was passed through an infusorial earth or unglazed porcelain filter under negative pressure, $\frac{1}{2}$ to 1 per cent. carbolic acid then being added as a preservative. Each beaker of serum was tested by running off the last 30 c.c. into a sterile test tube.

This test serum, having been taken during the final operation of placing the serum in bottles from which it was to be used, thus acted as a control on all previous operations. The tubes containing this test serum were placed in the incubator for twenty-four hours and then left for several days at room temperature so as to give any organisms which might be present every opportunity of growing.

At the end of this time the following tests were carried out, viz. :—

- (1) Five to 10 c.c. were placed on agar-agar in petri dishes.
- (2) Fifteen to 20 drops were placed in a closed arm of the fermentation tube (glucose bouillon) to test for anaerobic growth.
- (3) A blood serum tube (Loeffler's) was inoculated.

The above are the Government tests demanded in the United States of America for all serum used for human beings; and experience, and a number of independent tests which were carried out from time to time, proved that the serum produced at the laboratory was always sterile.

At one time doubts on this point arose on account of certain difficulties which were encountered but which were subsequently proved to be due, not to want of sterility, but to an anaphylactic reaction on the part of animals which received serum after too long an interval from the first dose.

Serum "P" produced in this way was in regular use from the beginning of 1918. It was first decided to use it as a prophylactic, and as the preliminary tests had been satisfactory, it was arranged in December, 1917, for Dr. Gregory to put up a considerable quantity of serum for this purpose, and to despatch it to purchasing points, where arrangements were made for a dose to be given to every alternate animal immediately after purchase.

The dose given for this purpose was one ounce, and this was given subcutaneously under the skin of the neck at a point where, should an abscess occur, no serious consequences were likely to arise. The work was carefully supervised by a senior veterinary officer.

Serum "P" was first used at Des Moines because the mortality among the horses purchased at this point had always been higher than among any others, and subsequently at Sioux City, St. Paul, and Chicago, while comparatively few doses were used at St. Louis and East Alton by Captain Gregg. During January and up to the

middle of February, roughly 2,000 doses of serum "P" were used in this way.

The system adopted was as follows:—

Every second horse purchased received a dose of serum and was marked with a special mark, the alternate horses being marked as controls. All were then despatched to various depots, and the veterinary officers at all depots were instructed to keep a careful record of the sickness and mortality occurring among the inoculated animals and the controls.

This test was completed about the middle of February, 1918, and, up to that time, the results were very good. Subsequently, however, it was clear that the immunity conferred was not very lasting, and horses which had been protected in the first instance began to develop sickness in the ordinary way when transferred to eastern depots at a later date. This was to be expected from a "serum alone" inoculation and, with a view to endeavouring to extend the period of immunity, arrangements were made for a second dose to be given to a limited number of test horses in one trainload, prior to despatch to the east. These horses were specially marked and an equal number of controls was also marked so that a record of results could be obtained. Nothing unusual was observed until about ten or fourteen days after they had arrived at the eastern depots to which they had been consigned, when they were run through the chute and examined with a view to any unsound animals being sold off under orders received from the War Office to reduce numbers. It was then observed that some of the horses which had received a second dose of serum developed peculiar symptoms, the most prominent of which were dyspnoea and dizziness.

These animals were at once sent to hospital for treatment, and pneumonia apparently supervened in a number of cases, with a high death rate. The chief symptoms during life in these cases were a temperature of from 104° to 105° F.; a weak, rapid pulse; numbers of petechiae on the visible mucous membranes; and marked dyspnoea and distress on being excited in any way. One or two animals dropped dead quite suddenly, apparently from cardiac arrest. Others which did not die developed a progressive anaemia, which necessitated a long period of convalescence. As its cause was not recognized it is impossible to obtain any exact records as to how many animals died from this condition, but the proportion of mortality from this and other causes was high. The total number of animals concerned in this test was, however, comparatively small (ninety-one all told), and the greater number of the animals which died at this time had received no serum at any time but had been accommodated in highly infected depots.

On post-mortem examinations no gross lesions were found to account for death, but the intestines and the whole of the organs throughout the body were covered with petechiae, and in the majority of cases the spleen was enlarged and softened, while the blood was dark-coloured and clotted slowly and incompletely.

From the first, having seen the cases which had occurred in the test animals referred to above, the D.D.V.S. was personally of opinion that the condition was due to anaphylaxis, but this opinion was not at that time shared by others, and it was at this time that doubt was thrown on the sterility of the serum, as mentioned above.

With a view to clearing up the question, the use of all serum was stopped for the moment, and arrangements were made for tests of the whole amount then remaining on hand to be carried out both at Newport News and independently, and for the control tubes, which were still retained at Newport News from each batch, to be again tested by cultural and biological methods.

All of these tests, with one exception, showed the serum to be sterile, and in the one case where infection was reported there is no doubt now that infection must have occurred in the laboratory at which the test was carried out. Owing to a question arising as to the reliability of this particular test at the time, a further test of the same lot of serum was carried out at another laboratory, with negative results, and the whole of that batch was afterwards used up with entirely satisfactory results. These tests confirmed the view that the trouble which had arisen was entirely due to anaphylaxis and when purchasing recommenced some time later, in May, 1918, it was arranged to have some of the serum remaining over, from the time when its use was stopped, again employed at the Montreal and Newport News depôts. The results obtained being entirely satisfactory, arrangements were made for the remainder to be used, and in the course of the next two months the whole of what remained on hand was used up, with highly satisfactory results. In the meantime, Dr. Gregory was instructed to prepare more serum "P" and by the beginning of August, 1918, a regular supply was available and the great majority of cases of shipping fever in the eastern ports were treated with serum "P" from that time forward.

The reduction in mortality and incidence of pneumonia is, it is thought, sufficient evidence of the benefit derived from that treatment, though it is not suggested that serum "P" was entirely responsible for the improved results obtained since May, 1918. There is no doubt but that other factors assisted very materially; there is, however, no hesitation whatever in recommending that, in any future operations in America, serum "P" should be given to every animal which develops fever, with a view to preventing the development of pneumonia.

Serum "P," like all other sera, must, however, be used on the right lines. It is useless to expect striking results unless the first dose is given at the earliest possible moment; and for this reason an essential part of the system of treatment with serum "P" is the taking of temperatures of all freshly arrived animals daily until fresh cases of fever cease to occur.

This serum should be regarded mainly as a preventive of pneumonia following shipping fever, not as a curative, but in operations

of this kind it should only be given after the original shipping fever has developed. Otherwise only a temporary passive immunity is conferred, which does not last long enough for veterinary purposes. Whether serum "P" would be of great value under the ordinarily less exacting and more sanitary system of handling animals in England is perhaps debatable, even if the causal organ is the same, and there is no doubt that under the system of handling the animals which was in force from May, 1918, the scope for its action was very much less than previously. Immediately an animal develops fever it should be given a dose of serum, and from that time forward up to the eighth day experience covering very large numbers showed that no serious ill effects need be feared. After the eighth day, at a time which has not been exactly determined, anaphylaxis, which may be fatal in a proportion of cases, is liable to occur, and at present no means of combating this is available. With the exception of the anaphylaxis mentioned above, and the formation of a small percentage of local abscesses when serum was given subcutaneously near the seat of a previous injection, no ill effects ever occurred from the use of serum "P."

That, on the contrary, benefit may have been derived from its use is suggested by the following graphs. Graph "A" shows the admissions on account of pneumonia before and after the use of serum "P"; and it will be observed that from the time serum "P" first came into extended use, during the first week of January, 1918, a rapid decline in admissions took place, from a maximum of 500 in one week in October, 1917, to an average of twenty-three a week during October, 1918.

Though other factors undoubtedly helped in bringing about these improved results, the reduced incidence of pneumonia synchronized exactly with the use of serum "P." There had been improvements in sanitation everywhere, and the erection of more covered accommodation, which had been going on since July, 1917, certainly had their effect; but, apart from serum "P," the factor of most importance was undoubtedly the closing of Calumet and the adoption of the system of concentrating the animals in Chicago stockyards and transferring them to the eastern depots as soon as possible after purchase. This system came into force when purchasing was resumed in May, 1918, and continued to the end.

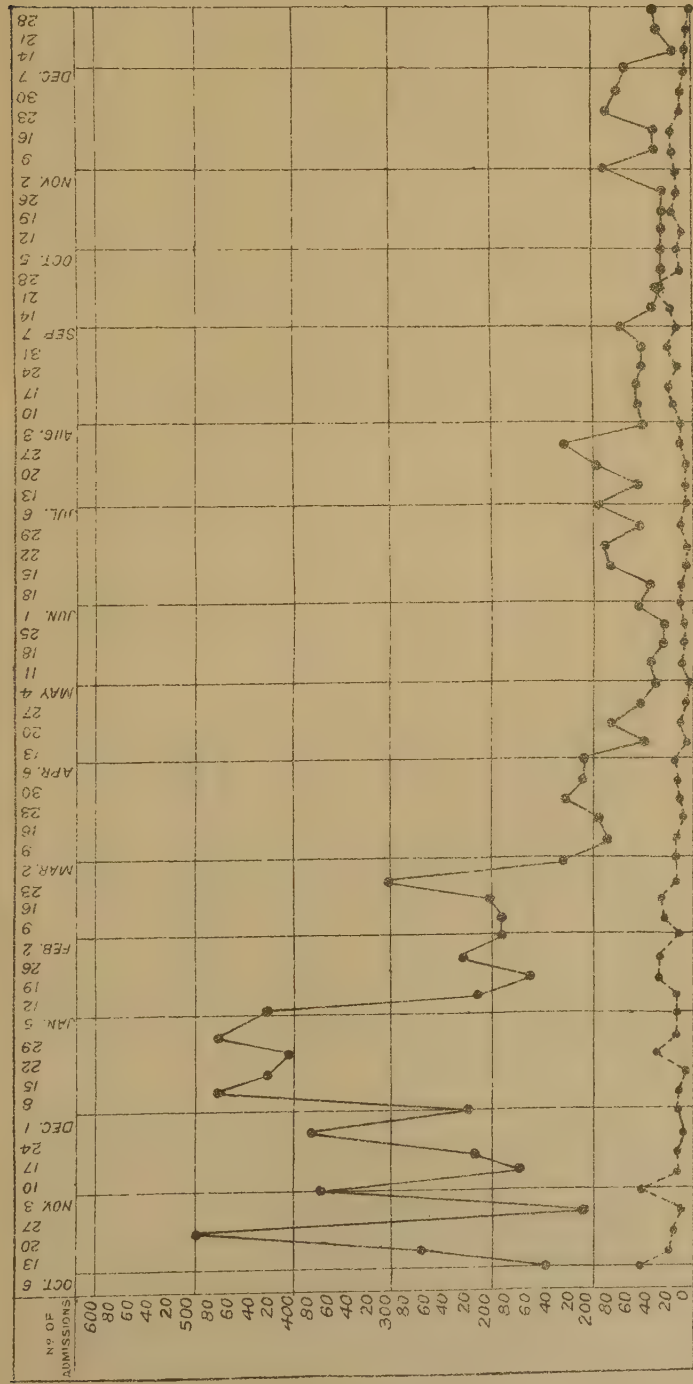
Graph "B" shows the comparative mortality among horses from pneumonia and from all other causes from the time when serum "P" first came into use.

For the period prior to December, 1917, there are no exact figures, but it was recognized that the mortality from pneumonia*

* A similar reduction in the mortality from pneumonia among remounts was effected in the United Kingdom without the use of serum (*see* Chapter XXIII). Consequently it seems probable that the part played by serum treatment in Canada was overestimated, and that the keener clinical outlook, which followed the introduction of routine temperature-taking, was underestimated.—(Editors.)

CHART SHOWING WEEKLY NUMBER OF CASES OF PNEUMONIA ADMITTED TO HOSPITAL.

PERIOD - OCT. 6TH 1917 - DEC. 28TH 1918.



No Serum used except a few doses at Newport News.

Serum D First used as a preventative.

No purchasing.

Insufficient Serum P available to enable all cases of Shipping Fever to be treated, but the majority received one or more doses of Serum "p."

All cases of Shipping Fever in Eastern Depots treated with Serum P. At end of October a severe outbreak of Pink-eye occurred against which Serum "p" appeared to have no action.

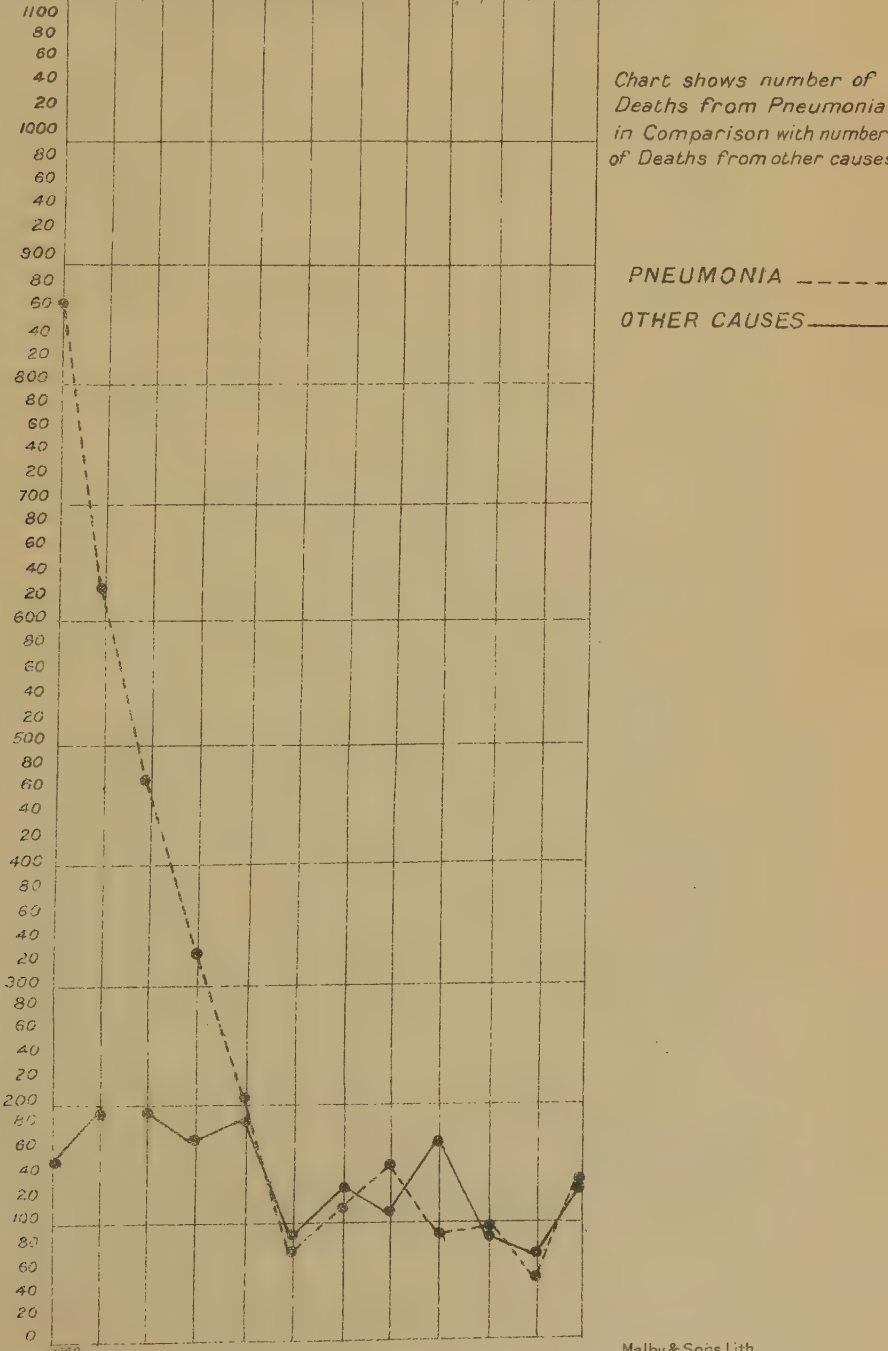
PURCHASES DURING THE PERIOD COVERED.		
MONTH	HORSES	MULES
1917.		
OCT.	7235	3750
NOV.	8269	2970
DEC.	8048	2314
1918.		
JAN.	6123	2038
FEB.	1838	1486
MAR.	---	110
APR.	---	82
MAY	2644	117
JUNE	8131	3305
JULY	7709	5981
AUG.	5171	1324
SEPT.	1070	2495
OCT.	4498	1452
NOV.	3405	---
DEC.	---	---

Graph B.

PERIOD

DEC 1917 - NOV. 1918.

	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV
FROM PNEUMONIA	883	624	469	328	205	78	109	143	86	94	47	124
FROM OTHER CAUSES	159	187	108	166	184	85	125	113	163	92	71	123
TOTALS	1022	88	567	494	389	163	232	256	249	186	118	247



had always been at least three or four times as much as from all other causes put together.

Complications of Pneumonia.

Paraplegia.—The most serious complication of pneumonia met with was paraplegia, which developed in a considerable proportion of cases and was known to be responsible for over 4 per cent. of the total mortality among horses since exact figures became available (during the last eighteen months), and 18 per cent. of the total castings during the same period. Complete recovery seldom occurs, and in a considerable proportion of cases the condition is so acute that the patient soon becomes unable to stand and has to be destroyed. In others the condition is more chronic and is not so severe as to prevent the animal from doing work in which it is not called upon to back.

In acute cases the condition is unmistakable. The animal stands with its back arched and the hind legs drawn under the body in a peculiar way so as to throw the weight forward on to the forelegs, which support practically the whole body. The temperature in these acute cases varies from 103° to 105° F. or over; the appetite is capricious, and condition is rapidly lost. The majority of such acute cases have to be destroyed, though some may recover sufficiently to be able to get about quite well, but even in the latter the prognosis is very poor and, if the animals do recover to some extent, deformity of the spine may remain.

In less severe cases all that is observed is loss of power and co-ordination of the hind legs, varying a great deal in severity. In severe cases the animal can hardly trot at all, and crosses its hind legs to such an extent as to make it remarkable that it does not fall. In other cases the condition might be missed by a casual observer, but the gait is typical to anyone with much experience of this condition. The characteristic gait is most noticeable at the trot and on turning, and more or less complete paralysis of the tail is one of the most certain indications. Animals only slightly affected are quite capable of doing straightforward work in chains, but they are always incapable of backing a load and, being unable to raise the hind legs properly, could be pushed over backwards if forced back in sticky ground.

All kinds of treatment were tried, particularly courses of arsenic, iodide of potassium, and strychnine, and numbers of horses were kept at light work for months in the depots, but complete recovery seldom if ever took place; more often the condition became progressively worse.

On post-mortem examination nothing very noticeable to the naked eye is found beyond some excess of fluid surrounding the spinal cord. Aspiration of this fluid during life was performed on several occasions for the purposes of making bacteriological examinations, but, with one exception, the fluid appeared to be sterile. In this case the organism found was a diplococcus.

What the exciting cause of this condition may be was not determined, but it nearly always followed pneumonia, and everything points to its being due to the same cause, probably intoxication with the toxins of bacillus "X," followed in some cases by secondary invasion with such organisms as the diplococcus mentioned above. The fact that this condition is so common in this country, while in England it is seldom met with, makes it doubtful if the causes of the "dealer's fever" of England and the "shipping fever" of Canada are identical. It may be, however, that the greater virulence of the shipping fever of Canada is responsible for the difference. This alone would hardly seem a sufficient explanation, and it is suggested that the jarring of the spinal column during the long train journeys of America has the effect of predisposing to spinal disease.

Whatever the cause, the condition is a very serious one, and it was considered that the commission would not be justified in shipping animals, even only slightly affected, as remounts for active service. As is the case with pneumonia, mules are far less frequently affected than horses.

Acute Tendonitis, with infection of the tendon sheaths, is another complication of pneumonia and "shipping fever" commonly met with. In this case, observations carried out at Newport News laboratory clearly show that the condition can be readily induced by inoculations with either bacillus "X" itself or its toxins. The tendons and tendon sheaths of the fore limbs in the neighbourhood of the fetlocks are commonly affected, but the hind limbs may be similarly diseased, and more than one limb may be involved. In severe cases it may be necessary to destroy the animal, but in the majority resolution eventually takes place sufficiently for the animal to become serviceable.

Strangles and Catarrh occurred much in the same way as would be expected among remounts purchased at home, and do not call for any special remark with the exception that, while the admissions on account of all other respiratory diseases fell since the commencement of 1918, the reverse was the case with catarrh. The reason for this may be that a large number of cases remained as simple catarrh, which under the old system of handling would have become cases of pneumonia.

In a series of bacteriological examinations of the bloodstream of forty cases of catarrhal fever, carried out at Newport News by Dr. Gregory, bacillus "X" was found in 47 per cent. of the cases examined either in pure culture or mixed with other organisms, usually streptococci and staphylococci. It is clear, therefore, that bacillus "X" is closely associated with catarrhal fever, though not so generally as with pneumonia.

Influenza.—At the end of October, 1918, reports were received from every shipping depot almost simultaneously to the effect that an extensive and virulent outbreak of a pink-eye type of influenza had occurred amongst the animals then being received from various points in the west, both horses and mules. In some cases over

50 per cent. of a whole train-load had to be taken into hospital immediately on arrival, many of them with temperatures running up as high as 107° F. Some of the animals on being taken off the train were in a dying condition and collapsed almost before they reached the hospital, with symptoms suggestive of embarrassment of the heart or acute intoxication.

The limbs in all cases were very much swollen and painful to the touch, the eyes were much suffused, and the conjunctival membrane highly coloured in a certain proportion of cases, with tears escaping from the inner canthus, but these eye symptoms were not always present. All the animals were, however, very stiff and sore, quite different from an ordinary case of "shipping fever," and swelling of the legs was very noticeable.

This disease was distinct from ordinary shipping fever, and probably actively contagious. Special instructions were issued regarding it, and serum was freely used in the hope that it might have some effect, but it appeared to have no action on influenza itself, though it no doubt had its effect on any concurrent sickness caused by bacillus "X." The death rate from this influenza was, however, high, and was mainly responsible for the increased mortality which took place during November, 1918.

The term "influenza" is unfortunately very loosely used on the American continent. The value of records of admissions on account of this condition is not therefore always very great from a statistical point of view, and it would be a great advantage if it were generally recognized that this term should only be used to indicate the actively contagious influenza which occurs from time to time in the form of an epizootic and is probably caused by an ultra-visible virus.

The condition so commonly met with in operations of this kind, and called in America shipping fever, appears to be quite distinct from influenza, and is possibly the same as ordinary "dealer's fever" in England, the difference of virulence being the result of the much more insanitary and trying conditions to which animals are subjected on the American continent after purchase as compared with those prevailing in England.

For this condition—in want of a better—the term "shipping fever" seems the most descriptive, but this name should be confined to the sickness which develops in a high percentage of the animals subjected to the insanitary conditions of handling and the trying circumstances of the long railway journeys of this country.

Previous outbreaks of actively contagious influenza had been reported since the commencement of operations by the Commission, but none apparently had been so widespread and acute as this.

Gangrenous Dermatitis.

Gangrenous dermatitis was the cause of considerable mortality, and a great deal of expense was caused to the Government from the fact that these cases, even if they ultimately recover, require a very

long period of treatment. Moreover, they are always liable to leave a certain degree of unsoundness or, at best, a scar which is liable to break down and become an open sore if at any time the animal is subjected to muddy conditions. On the American continent, as in all other countries, this condition is primarily associated with mud which, if not already infected, soon becomes so where large numbers of animals from all parts are being handled.

In March, 1918, the D.D.V.S. reported that he considered the causal organism to be almost ubiquitous and that, so long as muddy conditions could be avoided, there need be little fear of gangrenous dermatitis. In accordance with these views every effort was made to obtain hard dry standings for all the animals of the Commission, and, though this desirable condition of affairs was only very gradually attained, wherever such floors were provided no trouble from dermatitis arose.

A striking instance of the value of these floors (even though they are only made, as in this instance, of earth hardened with lime) occurred at Newport News in the summer of 1918. In the spring of that year a strictly limited amount of money was authorised for the provision of hard floors in a certain section of Newport News depot, and for the erection of fences to enable the animals to be kept under cover in rainy weather. Later, owing to shipping requirements, Newport News had to accommodate many more animals than could be placed under cover in the buildings so dealt with, and a number had to be held in the open in another section of the depot. In September, 1918, the general officer commanding was advised that similar action should be taken with regard to the extra accommodation which had to be used for these animals. The work however, was not carried out until later, and, in consequence of rainy weather, a considerable outbreak of dermatitis occurred among the animals accommodated in the section in which no provision had been made for keeping them under cover on hard floors, although this section was, naturally, the driest portion of the depot. In the other section, where the majority of animals were accommodated, but under cover and on hard floors, no cases occurred. Some of the animals concerned in this outbreak arrived from the East Alton depot already slightly affected with this condition, but the disease spread at Newport News, and it appears probable that the infection existed there in the soil from the previous outbreaks which had occurred.

The same remark applies, it is thought, to East Alton, and indeed to all of the older depots, but, in view of the fact that the bacillus necrophorus is said to be constantly found in the faeces of equines and hogs, it is easy to understand that it is probably always present in all depots. The opinion expressed officially in March, 1918, namely, that the organism of contagious dermatitis is almost ubiquitous in America and Canada, is probably correct.

Certainly in all of the depots where very muddy conditions obtained, dermatitis always occurred, but, with such large numbers

of animals passing through from every part of the United States, it may be said that infection was bound to be brought in sooner or later by an actual case of the disease. Whether heightened virulence occurs by growth in animal tissues is an interesting point for consideration. Experience, however, very clearly proved that not only can dermatitis certainly be prevented by accommodating the animals under cover on hard floors, but that the expense of providing this accommodation is amply justified on account of dermatitis alone.

There was a marked reduction in admissions on account of gangrenous dermatitis subsequent to the beginning of December, 1917, and though there were slight increases in April and August, 1918, these were very small compared with what had occurred in November, 1917. Had covered accommodation with satisfactory floors been available for every animal there is little doubt that even these small outbreaks would have been prevented. In the treatment of this condition various systems were adopted.

All authorities are, however, agreed that the first essential is to place the animals on hard standings and cleanse the affected part as thoroughly as possible; for this purpose gasoline has been found very useful. For subsequent treatment, a solution of iodine in ether was very extensively used and well reported on. Eusol was also largely employed for this purpose, but opinion did not appear to favour its continued use.

Latterly a solution made as follows was used, viz. :—

Chlorinated lime	..	..	28 grams.
Magnesium sulphate	..	..	18 "
Water	..	..	1,000 "

The salts are triturated in a mortar and the water added gradually, the solution then being filtered through cotton wool. This is said to be less irritating and more stable than Dakyn's solution.

All authorities were also agreed that the wound should be left open, that the sloughs should be removed as soon as possible without breaking them in the process, and that poultices, to hasten the removal of sloughs, should in no circumstances be used. When the slough has been removed and the causative agent destroyed as far as possible, some form of dry dressing is generally applied, and this may be best preceded by painting with the above-mentioned solution of iodine in ether a 20 per cent. solution of picric acid, or a saturated solution of potassium permanganate in distilled water. Ordinary dusting powders, such as boric acid, with oxide of zinc and iodoform, or a mixture of potassium permanganate, boric acid and alum, also appear to have given good results. At one depot, dry-powdered slaked lime was freely used, both on the floors to keep them dry, and on the wounds themselves, with apparently satisfactory results.

Whatever treatment is used, however, the healing process is slow, and advantage appears to be gained by frequent changes of

treatment; mild stimulation with such a dressing as oil and turpentine, or equal parts of tincture of iodine and petroleum, is useful.

Glanders and Mallein Testing.

As soon as possible after the veterinary service had been reorganized, arrangements were made for the testing of every animal then in the depots, and from that time forward a regular system of testing of all animals was carried out.

At first, as sufficient syringes were not available, and the majority of the veterinary officers with the Commission were not familiar with the technique of the intra-dermal palpebral test, the testing was carried out on the arrival of the animals at a shipping depot, and they were again tested immediately prior to shipment or on discharge from hospital.

Later a test was also carried out at the purchasing point, but this was done tentatively at first because it necessitated holding the animals for a certain time at these points. This it was desirable to avoid because it seemed clear that one of the secrets of handling our animals, from the point of view of the prevention of pneumonia, was to send them through to the shipping depots at the earliest possible moment. To do this, however, it was necessary to mix them at Chicago, and glanders infection would have been liable to be disseminated among the animals from different purchasing points if the animals had not been tested. Any objection to testing at the purchasing point, therefore, had to be waived, and in carrying out this test there was an added advantage that, in certain States, the State authorities paid compensation for any animals destroyed on account of a glanders reaction.

One difficulty with regard to mallein testing in America is the fact that all mallein testing in civil life is carried out by State veterinarians and not by civil practitioners, many of whom are not familiar with mallein testing in any form. Also, in a number of States, the complement fixation test is the official test. No animal is destroyed, nor is any compensation given, unless it has given a reaction to that test.

As far as the commission was concerned, reliance was placed mainly on the intra-dermal palpebral method controlled by the subcutaneous test. As, however, a large proportion of the officers were not familiar with any form of testing, they were not to be relied upon in interpreting such a delicate test as the intra-dermal palpebral, and the subcutaneous and complement fixation tests were always used as controls before an animal was destroyed. In a climate where the temperature is liable to fall as low as thirty or more degrees below zero, it is also often impossible to use a syringe in the open during the winter. Even under cover, unless the building is artificially heated, this is an impossibility.

In such circumstances, mallein eye discs had to be used at times, and a carefully controlled trial of this and other methods of testing

carried out at the Lachine depot during an extensive outbreak of glanders which occurred there in July and August, 1918, appeared to show that this test was just as reliable as the intra-dermal test.*

In this series of tests, which covered over 15,000 animals in all, the subcutaneous test was used as a control and was the most reliable of all.

Both the eye-disc and the intra-dermal test were also fairly reliable, but a number of animals were at first classed as having given positive reactions to the intra-dermal test which gave no reaction to a subsequent test by the same method, carried out in consequence of some of the intra-dermal mallein supplied from Aldershot and used in this test having proved to be infected. The animals tested with this infected mallein developed an abnormally big and painful swelling at the seat of injection within a few hours, and in a number of cases the epidermis sloughed off over a considerable area. This led to suspicion of the mallein, and no reliance was placed on the test where it was known that this mallein had been used.

In consequence of this the animals all had to be tested again, and examination of the suspected mallein, by cultural and biological methods, proved that various organisms were present in an active state of growth, while on careful examination of the ampoules it was found that in a certain proportion the sealing was incomplete.

Up to that time the value of the eye-disc had been doubted, but in view of the results of this trial the disc would appear to be a useful test at times when any form of fluid is liable to become frozen in the needle. It certainly seems to be preferable to the method commonly used in Canada and America, in which mallein is painted on the eye with a brush.

In applying the disc test, care should be taken to see that the disc dissolves in the tears before the animal is released, and that the mallein is supplied by a reputable firm. With these precautions the method is useful as an emergency test, and it has the advantages that the reaction appears very quickly and is easy to detect, while the production of antibodies in the blood is not induced by its use.

The outbreak at Lachine referred to above was the only outbreak of glanders which was at all extensive after July, 1918, and this would probably never have assumed the dimensions it did had the animals been held under cover in moderate sized pens.

As, however, the open air system was still in operation at the Lachine depot it is easy to understand that the occurrence of a clinical case among about 350 animals in one of the big paddocks might easily have been overlooked for some time, and that with common watering troughs and feed racks infection would rapidly spread to a large proportion of the animals in such a paddock. The animals in the paddock concerned were horses which had already been

* If officers with former practical experience of the intradermal test had been available for the purposes of this trial the eye-disc method might not have compared favourably with the intradermal method of testing.

through their sickness and which were not at that time immediately required for shipment. They might, therefore, not have been tested for some considerable time had the disease not been detected in an animal admitted to the hospital from this paddock, and the disease might easily have spread even further than it did. Even so, no less than sixty horses had to be destroyed, and the disease was confirmed in every case on post-mortem examination. Prior to destruction, both with a view to confirming the diagnosis and in order to take the opportunity of carrying out an extensive trial to determine the value of the various systems of testing in use, every animal destroyed was tested at least once by all four methods, i.e. the intra-dermal palpebral, the eye-disc, the subcutaneous, and the complement fixation methods. If any doubt arose further tests were applied until the diagnosis appeared quite certain; the animal was then destroyed; the post-mortem examinations, at many of which the D.D.V.S. was present, being made at the burial ground within the depot area.

The most definite conclusion which it was possible to form from this test was that the complement fixation method was very unreliable, but it is only fair to explain that this may have been partly due to the fact that all of the animals at that time had been very much tested by different methods; moreover, some of the animals tested in this outbreak showed very clearly that the intra-dermal method, like the subcutaneous, is apt to induce the production of antibodies in the blood for some time after the test has been applied.

In the routine testing of all animals at purchase and subsequently in shipping depots, a few cases of glanders were detected in the course of most months, and at the final closing down a few animals were destroyed at Chicago on the representations of the State veterinary authorities.

With this exception, and the possible exception of two horses which were reported to have reacted to mallein some little while after they had been sold, no cases of glanders were detected among the number (roughly 18,000) sold off at the final closing down.

Contagious Stomatitis.

During the months of October and November, 1917, contagious stomatitis was very prevalent throughout North America, and in the month of November, 1917, a very extensive outbreak took place at the Goshen depot, where at that time the facilities for the control of such an extremely contagious disease as this were not satisfactory. This depot had to be entirely closed, and no animal moved in or out of it for a month in consequence.

The type of stomatitis in this outbreak was exactly similar to what had been seen in France, but, on the whole, was not quite so virulent though extensive sloughing of the mucous membrane of the tongue occurred in a considerable proportion of cases. It did not cause death directly, but there is no doubt that this outbreak not only reduced the condition of the animals at Goshen at that

time very much but helped also to increase mortality by the consequent loss of vitality.

With a view to preventing a recurrence of similar conditions sanction was obtained for the expenditure of a certain amount of money at Goshen to ensure satisfactory segregation of the animals at that depot into groups, which up to that time had been difficult.

Though the direct loss from stomatitis is not great, it is a very serious condition when it becomes widespread among remounts, and, though very thorough measures may be taken to prevent spread of the contagion, there is always the risk of a case in the incubative stage being passed for shipment and thus infecting the whole ship-load. Moreover where a whole depot such as Goshen, with two or three thousand animals, has to be closed for a month, the cost of maintenance for that period, amounting to many thousands of dollars, is entirely wasted money.

Skin Disease.

Mange.—Before going to Canada the D.D.V.S. was informed that a large number of cases of both sarcoptic and psoroptic mange had been detected amongst the animals sent to England by this commission, and it was found on arrival that scabies evidently did exist, though usually in the early stage only and mainly affecting animals which had been running for a considerable time at such depots as Lathrop and Grand Island.

In the case of Grand Island, the majority of the animals had been purchased in a district which was well known to the U.S. Federal Veterinary authorities to be infected with mange. Mules from certain districts in the south were also found to be considerably affected, and this was also confirmed by the Federal Veterinary Authorities. The disease, however, never assumed alarming proportions, and it was often very difficult to say, in the case of a large proportion of the animals treated, whether they were actually affected or not. Every animal showing the least sign of skin disease resembling mange was treated by hand with calcium sulphide solution, and the condition quickly disappeared. Reports from England of the number of animals admitted to hospital on account of mange also ceased entirely from the middle of August, 1917, to the beginning of February, 1918. From that time forward, up till the end of March, reports were again received that cases were being detected in England among our animals, but the number was not so great as previously.

It is always a difficult matter in operations of this kind, where animals develop enormous coats and are running loose, ungroomed, in pens, to detect early cases of mange, and it is possible for these to exist without ever being detected. Veterinary officers engaged in purchasing duty were repeatedly instructed to be on the look out for signs of skin affection, and certainly very little could be seen at an ordinary inspection of any of our depots at any time during the past eighteen months.

For the treatment of mange it was originally intended to erect dipping baths on the same lines as those erected at various hospitals and behind the front in France. In view of the danger, however, of clipping and washing recently purchased animals in such a climate as this, it was decided not to proceed with these baths, and a plant for fumigation with sulphur fumes was erected instead. This was on similar lines to those which had been in operation in France, but more elaborately fitted in the matter of forced draughts and exhaust fans, to ensure the maintenance of a satisfactory concentration of gas during the whole hour which was found to be the length of exposure necessary.

Careful observations were made with this plant, covering over 600 badly infected animals, and it was found that, apparently without exception, one exposure of an hour to a concentration of sulphur fumes, high enough to put out a spirit lamp, was sufficient to destroy all lice and eggs, without clipping or any other forms of treatment.

The same plant was found useful for the treatment of bad cases of ringworm, but in slight cases it was not considered necessary to go to this trouble. Such cases were treated by ordinary methods, of which dressing with a solution of pixol and acetone appeared to be about the best ; where the animal was badly affected, however, an exposure of an hour to sulphur fumes appeared to be quite efficacious in curing the disease, without other treatment.

As to its efficacy in the cure of mange, no evidence was obtained, as, by the time the necessary plant was in operation, all cases of mange had been cured and, from that time forward, practically all the cases that occurred were detected in western depots and no cases were available at the shipping depots where these fumigation plants were erected.

Verminous Disease.

Infestation of the caecum and colon with nematode worms is well known to occur on the American continent ; in certain districts, both in Canada and the United States, these parasites are the cause of a great deal of debility and death amongst horses. The animals, however, being in good condition at the time of purchase and not remaining, as a rule, very long in the depots, never, as far as could be ascertained, suffered serious illness from the presence of these parasites. Repeated instructions were nevertheless issued to veterinary officers to be on the look out for them, and their presence was frequently reported at post-mortem examinations of animals which died from other causes.

During the autumn of 1917, reports were received from the D.G., A.V.S., that a large number of animals which had arrived in England on S.S. "Bovic" on August 25th, 1917, were found to be heavily infested on arrival. A number of these died or had to be destroyed, while the rest were in such a debilitated condition as to necessitate a long course of treatment and a long period of convalescence

before they could be rendered fit for service. The animals concerned were traced to two of the most insanitary depots, and it was reported at the time that infection most probably took place at these depots.

A scientific report, received in March, 1918, describing the parasites found in these animals, made it clear that such a heavy infestation as that described, with such a variety of parasites, could only have occurred under extremely insanitary conditions in the depots at which the animals had been accommodated.

A report therefore was addressed to the general officer commanding British Remount Commission, reviewing the difficulties that had been encountered by the veterinary staff of the commission in endeavouring to improve the sanitary state of the depots. It was pointed out that the insanitary condition of the depots was probably responsible for this heavy parasitic infestation among large numbers of animals congregated from all parts, and held in dirty pens and open paddocks quite incapable of being maintained in a sanitary condition. During rain or thaw such accommodation unavoidably became a hot-bed for the propagation of infection of all kinds, and these conditions could only be remedied either by total abandonment, as had been recommended in the case of Calumet, or the provision of covered accommodation for every animal with hard floors capable of being maintained in a sanitary condition, at Lachine and elsewhere.

These recommendations were subsequently carried out to a large extent, but the amount of money required to provide satisfactory buildings and flooring was always hard to obtain.

It would be difficult to devise a better method of inducing this condition in our animals than to accommodate them in muddy, insanitary pens and paddocks, in which eggs and larvae were constantly deposited by previous batches of affected animals, and parasitic infestation is bound to occur more and more wherever such conditions are allowed to exist.

As mentioned above, nematode worms have not apparently caused much active disease among our animals while in this country, but turpentine, thymol, and other parasiticides were extensively employed where suspicion of parasitic infestation existed. Turpentine given in two ounce doses after a fast of twenty-four hours is reported to be very efficacious.

Ophthalmia.

* Periodic ophthalmia is very prevalent in North America. The actual cause of this incidence is obscure, but want of light, almost total absence of ventilation, and insanitary conditions are constantly met with, both in Canada and the United States, even in stabling for the most expensive class of animal.

The conditions generally supposed to favour its development therefore exist, and moreover, in the north the animals are exposed to these conditions over a considerable period, owing to the severity

* See page 533.

and length of the winter, during which they are closely confined in very stuffy stables.

The attention of veterinary officers engaged in purchasing duty was frequently drawn to the necessity of rejecting animals which showed signs of having been affected with this condition, and there is no doubt that every care was taken; but the detection of the previous existence of ophthalmia in the eye, which is not actively affected at the time, is always a difficult matter. However careful the examining veterinary officer may be, a certain number are passed, and a proportion of these eventually become blind or partly so.

Such animals constituted 3.26 per cent. of the total castings, but others, which did not develop a recurrence, were no doubt shipped, and it is feared that this will always be the case in buying remounts in North America. Anyone engaged in the purchase of remounts should therefore be constantly on the look out for signs of a previous attack, such as shrinking of the eye-ball, wrinkling of the eyelids, and changes in the internal eye indicative of inflammation in the past.

The purchasing centres most liable to this condition appear to be Chicago and the Des Moines-Cedar Rapids area, where the majority of the animals bought are of the heavy type, which are usually fed up for sale in stuffy, insanitary stables.

A few observations were carried out at the Newport News laboratory with a view to determining the cause of this condition, but nothing very definite transpired, nor has anything new been advanced as regards treatment.

Fistulous Withers.

Fistulous withers was a condition commonly met with among the remounts, far more so than has been seen elsewhere, and it is very difficult to explain what the cause of this may be.

Various theories have been advanced, such as biting, rolling on stony ground, and bumping on the tops of the car doors, but none of these appears to explain all the circumstances. Biting was infinitely more common among the Arab stallions of the Egyptian Army, and in the troop stables at home, and yet in those circumstances a case of this condition seldom occurred apparently spontaneously, as it usually did in Canada and America.

Rolling on stony ground also only applied to one or two of the depots, but the condition was universal, while bumping on the tops of car doors, though possible, could not easily happen. Moreover, cases commonly develop for no apparent reason in animals which have been standing a long time in hospital, and there is seldom any evidence of injury externally, nor is the fracture of the dorsal spine found on exploration.

It is suggested that this condition is also possibly due to the action of the toxins of bacillus "X," probably by producing a debilitated condition of the tissues and thus favouring the development of the pus organisms which are usually found in these lesions,

in the same way as occurs in the infection of tendons and tendon sheaths mentioned above.

The disease, however caused, is a very intractable one to deal with, but, by laying the abscess cavity open boldly at first so as to facilitate drainage and allowing it to heal from the bottom, good results may eventually be obtained. A very long time is always required, however, for complete healing to take place, and if any less drastic operation is performed the disease will almost certainly recur.

Where good facilities for operation and subsequent treatment exist, favourable cases in the early stages are probably worth treatment, but otherwise it may be more economical to destroy at once animals in which the condition is found on exploration to have involved such tissues as the ligamentum and the dorsal spines.

CHAPTER XXII.

THE VETERINARY SERVICES WITH THE URUGUAY
REMOUNT COMMISSION.

THE Uruguay Remount Commission consisted of three veterinary and five other officers, making a total of eight, including the officer in charge of the commission, Mr. Cunningham Graham.

The commission left Liverpool on November 20th, 1914, on the R.M.S. "Arlanza," and arrived at Montevideo, the capital of Uruguay, on December 12th; but it was not until some weeks later that the serious work of the commission began. This delay was caused by the necessity of ascertaining the stamp and the extent of the horse resources of the country and of taking the steps necessary before actual authority for purchase could be obtained.

During this period the senior veterinary officer stayed, at the request of Mr. Graham, at the headquarters office in Montevideo, and was able to assist in the official and clerical work of the commission, which rapidly assumed considerable proportions.

This preliminary period was partly spent in interviewing a large number of horse-owners, dealers, and contractors of the country. As Mr. Graham possessed a perfect knowledge of Spanish, these interviews were conducted for the most part in that language; the English farmers of Uruguay do not comprise more than 5 per cent. of the agricultural population. While this information was being secured, the purchasing members of the commission, sometimes accompanied by a veterinary officer, were making a tour through certain of the horse-raising provinces of Uruguay. The result was that early in 1915 Mr. Graham was in a position to decide upon the best system of obtaining the horses required by the War Office.

Under the system of purchase through the medium of contractors, the headquarters of the commission were removed to Fray Bentos, a small inland town some 100 miles up the river La Plata. Here vessels of considerable draught were accustomed to come to the meat extract works of Messrs. Liebig & Co. Into the depot formed at this place all horses had to be delivered under the terms of the contract; and from here they were forwarded for shipment as required.

It had been originally intended to embark horses from Fray Bentos, but this arrangement fell through, and Montevideo was decided upon as the port of embarkation. The horses were entrained in wagons at Fray Bentos and conveyed by rail, a journey occupying some eighteen or twenty hours, to the point of embarkation.

The adoption of this plan necessitated the detailing of an officer of the commission for duty at Montevideo in connection with shipping

and rail arrangements, while the remainder received and forwarded horses from the depot at Fray Bentos. The chief of the commission requested the senior veterinary officer to undertake the duties at Montevideo, both on account of his previous experience of this work and also because, under the adopted system of purchase by contract, two veterinary officers were found ample to deal with the examination of the horses brought in small detachments to the depot or collected at centres within easy reach by rail.

As the instructions of the commission were to the effect that practically sound and useful animals should be shipped, the veterinary examination was not of a very exacting nature, and a certain latitude in the matter of age, etc., was considered permissible. Although the technical examination was not of an unduly strict nature, a large percentage of the horses presented for purchase were rejected, not more than 35 per cent. being able to pass all requirements of height, age, stamp and soundness. Under this system of purchase, such rejected horses were returned upon the contractor's hands without prejudice to the commission. Keeping in view the question of practical utility, the limits of age were set down as between five and twelve years, and, in some few instances where compensating points existed, the limits were slightly extended. The height limit was placed at 14·3 hands; only 3 per cent. of the horses forwarded being below this standard. As the horses of the country are small, some difficulty in securing those of this height was experienced, and failure to reach the standard was a frequent cause of rejection. Considerable difficulty was experienced in obtaining horses of the heavy type suitable for artillery.

Uruguay would appear to be exceptionally free from stock diseases of an infectious or contagious nature, and, during a six months' experience, no case of the sort was observed. Sporadic cases of anthrax occur occasionally, but glanders and strangles seem to be of extremely rare occurrence. In fact, the risk of glanders infection seemed so remote that it was not considered necessary to subject to the mallein test the horses forwarded, no suspicion of the disease existing in any of the districts from which they were drawn.

Parasitic mange, so far as could be ascertained, was of infrequent occurrence, though the appearance of the skin, particularly of the face, from the result of tick attack, often closely simulated mange.

Emphysema of the lungs was very rare, and lymphatic diseases, contagious or otherwise, seemed absent.

The most frequent cause of rejection from veterinary reasons was cataract. This affection seemed unusually prevalent, and many rejections were made on this account, both for single and bi-lateral cataract. The percentage of rejection for lameness was not above that usually seen in other countries. Sprains and bony growths in connection with the fore-limb were the chief causes of such rejections. Spavin and curb were comparatively rare, and the feet generally were good.

Taken altogether, the veterinary condition of the horses of Uruguay appeared to be distinctly above the average in matters of health and soundness, the large percentage of rejections being due to deficiency in height or condition.

In the breeding of the Uruguay horse but little trouble or care in selection seems to be taken, a fact perhaps due to the state of political unrest hitherto existent in the country, the horses of which have been repeatedly liable to sudden seizure either by the government or revolutionary forces. This has caused complete disorganization of horse-breeding in a country naturally adapted for it, and the result has been the production of a class of horse indefinite in type and deficient in height, but possessed of good powers of staying, and meeting the requirements of the people of the country as a general utility animal.

Many of the horses in Uruguay have been imported from the contiguous districts of the Argentine, and many of them bear two or more brands showing their transference from owner to owner. The design of some of these brands is very intricate.

The depot at Fray Bentos was provided with a limited veterinary equipment both of instruments and drugs, but they were seldom required. When the depot was closed arrangements were made for the sale of the drugs locally as far as possible, and for the return of some of the instruments to the Veterinary Stores, Woolwich, if they could not be disposed of at a reasonable price.

It was originally intended that the Admiralty should undertake all arrangements for boats, fittings, etc., and place vessels at the disposal of the commission, ready for loading at the mole at Fray Bentos upon certain pre-arranged dates. Owing to the exigencies of the service, however, the Admiralty was unable to carry out this programme, and certain general cargo boats were chartered, either by the War Office in London or by the commission at Buenos Ayres, and all fittings and forage arrangements made before the boat left that port for Montevideo, distant some twenty hours' sail, where the actual embarkation was made.

The embarkation duties at Montevideo were entirely in the hands of the senior veterinary officer, who inspected the fitting of the six vessels chartered; the horses were in most cases carried on the upper decks, so that no difficulties in ventilation were encountered. In one boat, however (S.S. "*Hesperides*") it was necessary to insist on the fitting of an adequate number of wind-sails to the lower deck where a certain number of horses were carried.

The general system of fitment left much to be desired. No exercise was possible, nor could the horses' feet be reached; and it was only with much difficulty and the carpenter's assistance that animals could be removed from their stalls in case of need. The watering arrangements, though doubtless capable of being made efficient, were considered to be inadequate in a ship where little or no routine or discipline could be secured. The system of watering horses from buckets is apt to be perfunctorily carried out

unless attendants are either very conscientious—an infrequent attribute of the horse attendant on board ship—or are closely supervised. The watering of twenty or twenty-five horses by one man from a small bucket along very narrow and crowded gangways is apt to result in the animals going short of water as a rule rather than as an exception ; in consequence, no matter how good the scale of feeding, loss of condition will certainly ensue.

Attendants were only secured with difficulty, and were largely composed of Russian and Italian men wishing to return to Europe but possessing no knowledge of horses. Had it not been for the reservists rejoining their colours it might not have been possible to arrange for the required numbers of attendants for each boat. These men were placed in charge of a capataz or foreman who had had previous experience in the shipping of horses, and the general efficiency of the work and responsibility for final result depended mainly upon this man, who with much tact and constant watchfulness and a command of several languages might possibly ensure the well-being of the shipment.

This arrangement for shipping, although the best under the circumstances, left much to be desired, and it was recognized that a final satisfactory result would depend almost entirely upon the good fortune of a quiet passage and the absence of any form of contagious disorder. It was eminently desirable that a veterinary surgeon should accompany each shipment, but this of course was out of the question, nor could the most assiduous professional care have compensated entirely for the deficiencies of fitting and personnel.

The total number of horses forwarded was 2,232—and six ships sufficed to convey them to England.

The trains conveying shipments generally arrived at Montevideo about 7 a.m., and embarkation was generally completed before noon, owing to an excellent railway system of handling live stock in end-to-end wagons.

All horses were carefully examined before leaving Fray Bentos, and were subjected to a further veterinary scrutiny by the port veterinary officials before embarkation.

CHAPTER XXIII.

ANIMAL DISEASES.

IT was not considered advisable to include in this chapter the whole of the observations on the subject of animal diseases which are contained in the reports and contributions available for the purposes of this history. In the chapters dealing with the expeditionary forces and the remount commissions, there are many pathological observations which lose much of their value in being removed from their contexts. The consideration of tropical diseases, especially, is bound up with the military and geographical circumstances in which those diseases appeared, and to a great extent this is true of the incidence of diseases and injuries generally.

The policy chosen, therefore, has been to restrict the matter in this chapter, for the most part, to the study of the animal diseases which occurred in the United Kingdom, France and Belgium.

It is mentioned in the chapter on administration that when official reports on subjects of special technical interest and importance were received by the Veterinary Directorate of the War Office they were offered in whole or in part to the professional journals for publication. In the compilation of the present chapter, it is thought sufficient, where the complete official reports have already been so published, to refer the reader to the title of the journal and the date of publication. There was, in fact, no alternative to this procedure, because space does not permit of the inclusion of the detailed reports in this chapter.

The number of animals employed by the British forces in the Great War is difficult to imagine. At one period during 1917 the strength of animals on all fronts totalled over 1,000,000, of which 436,000 were in France.

The average daily number constantly sick on all fronts rose during that year to over 110,000.

The total dead wastage during the period from August, 1914, to November, 1918, from all causes, including enemy action on land and sea, was more than half a million animals, of which 269,000 were lost in France.

The weekly wastage of horses and mules for replacement of casualties in field and L. of C. units in France* and Belgium varied between 1 per cent. and 3 per cent., and was on an average nearly 2 per cent. of the total strength.

* Figures relating to the weekly wastage for replacement of animal casualties in Italy and the eastern theatres of war are given in the chapters dealing with the expeditionary forces concerned.

These figures mean that a force in northern Europe containing 10,000 animals will require on an average 200 animal reinforcements each week to maintain establishments.

The "weekly wastage for replacement" includes a large proportion of animals that are evacuated to veterinary hospitals for necessary treatment of temporary disabilities. These animals are soon cured, and are then discharged to remount depots for conditioning and re-issue to units.

Until this source of supply of serviceable animals to replace casualties is established, namely, during the first three months of a campaign, animal reinforcements, i.e., remounts, must all be obtained from outside sources, but at the end of that time, when fit animals are becoming available on discharge from veterinary hospitals, the numbers required from outside sources will be proportionately less.

The average sick rate was about 11 per cent. of strength, and the mortality varied from a rate representing 20·64 per cent. a year in 1914 to 9·65 per cent. in 1916. During the first five months of 1917, owing to conditions in France, it rose again in that theatre, but returned to the normal during the summer.

The total admissions to veterinary hospitals were 2,562,549 patients, of which 78 per cent., or approximately 2,000,000, were returned to duty. The majority of the remainder were humanely destroyed.

A certain amount of statistical information is given in the chapters dealing with the several fronts, but for purposes of ready reference, and to afford a bird's-eye view of what was done, the following tables are included :—

Horses and Mules in Veterinary Hospitals and Convalescent Depots.
August, 1914, to March 31st, 1919.

	Horses and Mules.		Remaining 31st Mar., 1919.	Cured of those discharged
	Admitted.	Cured.		
Home Commands	1,328,551	1,082,097	3,485	per cent. 81·66
British Expeditionary Force, France	859,178	534,744	14,951	63·33
Egypt, January, 1915, to March, 1919	178,355	142,734	4,822	82·25
Salonika, December, 1915, to March, 1919	71,314	56,448	1,394	80·73
Mesopotamia, October, 1916, to March, 1919	74,673	61,761	2,494	86·95
Italy, January, 1918, to March, 1919	14,478	9,862	28	68·18
	2,526,549	1,887,646	27,174	

Veterinary Statistics.—Period of Hostilities, 1914 to 1918.

Showing the Average Annual Strength, Average Constantly Sick, and Mortality Percentage of Strength.

Period.	Theatre.	Animals.	Average Strength.	Average Number Constantly Sick.	Percentage of Sick on Strength.	Died, Killed and Destroyed.	Percentage of Mortality on Strength per annum.
August, 1914 to December, 1914.	Home France and Flanders	Horses and Mules Horses and Mules Total	97,543 107,085 204,628	14,615 16,551 31,166	14.98 15.45 15.23	4,612 13,025 17,637	11.32 29.16 20.64
January to December, 1915	Home France and Flanders Egypt "	Horses and Mules Horses and Mules Horses and Mules Camels Total	208,312 222,326 51,381 1,115 483,134	24,605 21,566 3,960 — 50,131	11.81 9.71 7.70 — 10.37	20,174 26,594 6,372 80 53,220	9.68 11.96 12.40 7.17 11.01
January to December, 1916	Home France and Flanders Egypt " Salonika Mesopotamia ..	Horses and Mules Horses and Mules Horses and Mules Camels Horses and Mules H.M.B. and C. .. Total	168,298 379,613 57,216 27,005 60,523 51,755 744,410	21,998 34,104 8,260 4,005 4,364 2,029 74,760	13.07 8.98 14.43 14.83 7.21 3.92 10.04	11,975 43,543 6,682 3,758 4,652 1,237 71,847	7.11 11.47 11.67 13.91 7.68 9.56 9.65

January to December, 1917		Home	..	Horses and Mules	138,033	19,691	14.26	11,968	8.67
		France and Flanders	..	Horses and Mules	436,121	52,350	12.00	99,923	22.91
		Egypt	..	Horses and Mules	71,765	9,897	13.79	9,658	13.45
		"	..	<i>Camels</i>	46,334	7,205	15.55	6,785	14.64
		Salonika	..	Horses and Mules	85,792	12,804	14.92	9,608	11.21
		Mesopotamia	..	Horses and Mules	63,968	3,583	5.60	4,786	7.48
			..	<i>Camels</i>	2,939	829	28.20	2,077	70.67
			..	Bullocks	4,534	212	4.67	332	7.32
		Italy	..	Horses and Mules	28,858	4,061	14.09	338	10.31
		Total	..		878,344	110,632	12.59	145,475	16.56
January to 11th November, 1918.		Home	..	Horses	88,897	12,932	14.54	6,591	8.90
		"	..	Mules	12,501	1,481	11.84	654	6.27
		France and Flanders	..	Horses	304,341	30,130	9.90	71,768	28.29
		"	..	Mules	92,195	5,200	5.64	14,105	18.34
		Egypt	..	Horses	60,547	9,858	16.28	10,240	20.29
		"	..	Mules	53,805	3,585	6.66	4,987	11.11
		"	..	<i>Camels</i>	40,126	9,025	22.49	7,954	23.78
		Salonika	..	Horses	19,609	2,224	11.34	1,876	11.47
		"	..	Mules	45,327	3,885	8.57	1,683	4.45
			..	Horses	36,969	4,074	11.02	3,135	10.17
		Mesopotamia	..	Mules	44,095	1,548	3.51	1,277	3.46
			..	<i>Camels</i>	2,494	328	13.15	2,158	10.26
			..	Bullocks	4,378	201	4.59	296	8.11
		Italy	..	Horses	15,900	1,861	11.70	800	6.03
		"	..	Mules	6,322	426	6.73	276	5.23
		Total	..		827,506	86,758	10.48	127,800	15.32

The chief causes of mortality in horses and mules were :—

- (1) Battle casualties, other injuries and surgical conditions ; destruction for old age, premature physical decay, and blindness.
- (2) Debility and exhaustion.
- (3) Respiratory diseases.
- (4) Mud-borne diseases, such as ulcerative lymphangitis and gangrenous dermatitis.
- (5) Trypanosomiasis (in East Africa).
- (6) Glanders, including destruction of reactors.
- (7) Intestinal diseases.

In camels, by far the greatest cause of mortality was debility in conjunction with mange and trypanosomiasis.

In the cattle which were maintained for draught and food in East Africa and Mesopotamia, rinderpest and piroplasmosis were the principal fatal diseases.

The incidence of sickness and mortality naturally fluctuated according to circumstances.

The rate was high in the United Kingdom during 1915 on account, chiefly, of respiratory diseases in heavy draught horses.

In the spring of 1917, during arduous military operations in severe weather, the annual rate of mortality among animals with the British Expeditionary Force in France rose to over 25 per cent.

Further particulars, as follows, are given of the principal diseases separately.

Debility and Exhaustion.

The exigencies of war necessitate wastage of animal life from debility and exhaustion. The chief causes of these conditions, are :—

- (1) Shortage of water or food, or both.
- (2) Overwork.
- (3) Exposure during cold, wet, weather.
- (4) Bad animal management.

The arrangements for the supply and distribution of forage during the Great War were wonderfully complete, but it was necessary at times for economic or military reasons to make temporary reductions in the scale of rations.

The best military organisation cannot ensure an adequate or regular water supply in the circumstances of desert warfare or where, as in a phase of the campaign in Mesopotamia, the enemy holds the river banks.

In France, subsequent to the retreat from Mons, long forced marches of mounted troops rarely occurred, but there was much necessary overwork of animals involved in dragging guns and vehicles over relatively short distances of intensely heavy ground.

The mounted operations in Egypt, Palestine, Mesopotamia, and South-west Africa lacked nothing in forced marching and shortage of water.

Exposure to mud, wet, and cold, was continuous during the winter months of the campaign in France and Belgium.

It was inevitable that the standard of horsemastership among the personnel of the New Armies should be low. The great majority of officers and men needed experience of animal management, and this experience could only be gained slowly from bitter lessons in the field.

The first losses from debility and exhaustion on a great scale occurred in the first half of the year 1917 in France. All the requisite factors were present: a temporarily reduced forage ration; a cold winter and a colder spring; much rain and mud; clipped horses; and arduous offensive operations. The official description of the matter was as follows:—

“During the first fortnight of February, active operations were at a standstill, forage was adequate and, in spite of cold weather, the condition of the animals was being well maintained. The wastage from debility was accordingly low. From February 15th to March 31st the weather increased in severity and there was more movement of troops, with a corresponding increase in the amount of debility.

“In April the bitterest weather conditions prevailed, the forage ration had to be reduced, and 195,000 animals were engaged in the arduous offensive operations in front of Arras, with the result that the toll of debility and exhaustion reached an unprecedented level.

“The actual figures are as follows:—

					<i>Admissions for Debility.</i>
February 1st to 4th	..	1,678	}		5,317
February 15th to 28th	..	3,639			
March	..	..	..	..	9,427
April	..	..	..	..	20,319

“With the advent of better weather, diminution of work and an augmented ration, the admissions for debility during May and June dropped to 3,032 and 1,253 respectively.”

The abnormal incidence of rain and mud had much to do with this wastage. It is natural that it should be difficult to get men to attend closely to animals in matters of watering and feeding, when rain is falling heavily and the horse-lines are deep in mud. Great wastage of forage is unavoidable under these conditions. The hay is soiled and rejected, and every particle of food that escapes from the nosebag is lost in the mud.

The fact that all the animals had been kept clipped as a precaution against mange may have contributed to this disastrous occurrence.

There were two important consequences: it became a fixed rule that no animals were to be clipped in the field after November 15th; there was a temporary loss of confidence in the capacity of

the Army Veterinary Service in France to deal *entirely* with the question of horsemastership in the field. This resulted in the appointment of officers without scientific training to advise in matters pertaining to feeding and condition; it ought to be stated that this measure was not adopted in any other theatre of war.

The prevention of animal wastage from debility and exhaustion in all theatres of war called for unremitting effort from the Army Veterinary Service.

Education of combatant officers, advice, supervision, and constructive efforts were included in the measures taken.

The policy adopted in France, made possible by the highly organized lines of communication, was that of evacuating animals as soon as they began to lose condition. Delay meant that recuperation became a matter of months, or could not be effected at all.

The circumstances necessary for the rapid recovery of debilitated animals were not found as a rule in the front line; they existed only in the veterinary hospitals on the lines of communication.

Research into the nature of debility by post-mortem examination showed that a considerable proportion of the cases regarded as ordinary debility were affected with gastric ulceration.

The incidence of debility among mules was far less than among horses.

Other occasions when heavy animal wastage occurred from exhaustion and debility were:—

- (a) The mounted operations in Egypt and Palestine.
- (b) The advance to Baghdad.
- (c) Winter operations on the Salonika Front (1915).
- (d) The final stages of the operations in South-west Africa.

Apart from these exceptional occasions, however, the occurrence of debility on a large scale among army animals was happily absent.

The complete arrangements for the distribution of rations, the rational treatment of mange, and the adequate organization of the Army Veterinary Service, were the factors which, on the whole, kept the army relatively free from trouble in this respect.

Respiratory Diseases.

Considerable difference of opinion and confusion existed at first concerning the nature of the disease then generally described as "contagious pneumonia" which, for the first twelve months of the war caused heavy and continuous losses among remounts, especially heavy draught horses.

The first serious outbreak of pneumonia occurred in a temporary remount depot, or collecting centre, for heavy draught and other horses, which was formed on mobilisation in the cattle quarantine sheds at Deptford. Here the rate of mortality for a short period was extremely high.

It is unfortunate that, owing to the rush of the early days of the war, time and facilities were lacking for a scientific investigation into the nature of this outbreak, which was regarded as an epidemic of contagious pneumonia (the thoracic form of influenza).

The fact that animals sent away from the depot did not carry the infection to other centres suggests that this diagnosis was mistaken, and that the disease was simply that type of pneumonia, usefully, if unscientifically, described in America and Canada as "shipping fever." The term is useful because it at once indicates the causation and non-infectious nature of the disease.

Be that as it may, the cattle sheds of Deptford were held to be an infected area and ceased to be used as a depot as soon as it was found practicable to close it down.

The remount depot at Swaythling then became the chief reception and drafting centre for heavy draught horses, and during the year 1915 the mortality from pneumonia there often exceeded fifty animals a week.

The circumstances were that, at the outbreak of war and for long afterwards, heavy draught horses were acquired by the remount authorities in country districts (chiefly in the north of England and Wales) and despatched to the remount depots at Swaythling and elsewhere in the south of England, for issue to mobilising units and drafts for overseas. They were, as a rule, sent away by train soon after purchase.

This class of animal had never before been used in large numbers for the purposes of war by the British army; consequently the mortality which occurred among them was not generally foreseen.

The modern heavy draught horse, whether Shire or Clydesdale, is a highly specialised type, departing widely from the normal or original type of horse, leading a relatively pampered life and therefore of a delicate constitution.

The heavy draught horse, as a rule, is bred and maintained under localised tranquil conditions of environment and work, and is, as compared with the lighter classes of draught horse, highly, or at any rate abundantly, fed.

Colonel A. Olver, as the result of his observations as Deputy Director of Veterinary Services with the British Remount Commission, concluded that these circumstances, rather than any inherent weakness of constitution, were the cause of the remarkable susceptibility of the heavy draught horse, on the whole, to respiratory disease.

In consequence of the heavy losses at Swaythling and elsewhere, and of the wide differences of opinion that existed as to the nature and causes of the disease, it was decided, in the spring of 1915, that this variety of pneumonia would very properly form the subject of special veterinary research, but unfortunately the facilities required for this research did not then exist. Ultimately the financial authorities agreed to make a definite grant of money for this purpose, on condition that the investigation should be limited to a certain period. Lieut.-Colonel Watkins-Pitchford was appointed

to carry out the investigation, which in due course bore fruit. The following facts were established :—

- (1) That the nature of the disease was that of an auto-infection in a delicate organisation subjected to the unaccustomed hardship and excitement of hurried concentration and railway journeys.
- (2) That a state of common catarrh or “ cold ” frequently preceded the disease.
- (3) That most of the deaths occurred as the result of moving, entraining, or shipping animals while they were in a state of unsuspected high temperature, which is often produced in horses by those circumstances, and always precedes the advanced symptoms of equine pneumonia.
- (4) That the disease when established was not infectious under ordinary conditions, although the preliminary condition of hyper-pyrexia might be.

Every attempt to produce typical septic pneumonia in healthy animals in favourable circumstances by means of inoculating them with, or feeding them upon, morbid substances from diseased animals, failed.

- (5) That the losses could be greatly reduced if animals were kept for at least two weeks under clinical observation and entrained only when their temperatures were found to be normal.

As soon as the above facts were established, instructions were issued which embodied the principles of prevention. These instructions at first were restricted to arrangements for heavy draught horses, and were faithfully carried out by remount and veterinary personnel alike. The text of the instructions, dated September 30th, 1915, was as follows :—

“ . . . I am directed to inform you that investigations carried out during the past year have sufficed to prove that septic pneumonia among remounts and freshly joined horses, occurring subsequent to journey by rail and sea, is very frequently due to the fact that horses have been put on rail or embarked on ships while in a state of high temperature, unaccompanied by any visible symptoms of disease.

“ I am to request, therefore, that you will be good enough to issue instructions that in no case will horses, in the categories mentioned hereunder, be despatched from one station to another unless their temperatures have been taken and found to be normal not earlier than on the day immediately preceding such journey :—

- (1) Horses proceeding from one remount depot or collecting centre to another remount depot.
- (2) Horses leaving remount depots to join units.
- (3) Horses leaving a remount depot in England for embarkation overseas.”

The consequence of these preventive measures was that the mortality among heavy draught horses at Swaythling and those shipped to France dropped from fifty to less than ten a week, and that never again during the whole war was there any heavy loss from equine pneumonia.

The following table, which shows the comparative mortality at Swaythling during the first six months of 1915 and 1916 respectively, affords conclusive evidence of the value of routine temperature-taking in the prevention of equine pneumonia :—

Week ending 1915	Admitted.	Died.	De- stroyed.	Week ending 1916	Admitted.	Died.	De- stroyed.
2 Jan.	188	40	3	1 Jan.	309	8	—
9 "	188	61	1	8 "	63	13	—
14 "	225	53	7	15 "	231	11	1
21 "	422	51	2	22 "	163	6	1
28 "	140	63	2	29 "	73	4	1
6 Feb.	139	60	1	5 Feb.	185	5	1
11 "	134	34	1	12 "	90	7	—
20 "	172	42	1	19 "	104	8	3
27 "	275	42	—	26 "	161	9	—
6 March	287	52	1	4 March	110	6	1
13 "	388	43	—	11 "	210	3	1
20 "	327	46	—	18 "	112	4	3
27 "	328	56	—	25 "	107	7	—
3 April	499	59	—	1 April	149	8	—
10 "	190	56	—	8 "	67	4	3
17 "	420	36	—	15 "	76	6	—
24 "	500	35	6	22 "	112	1	1
1 May	192	49	3	29 "	150	4	—
8 "	319	41	1	6 May	131	4	—
15 "	335	38	—	13 "	92	1	1
22 "	272	41	1	20 "	56	3	1
29 "	438	46	—	27 "	123	5	—
5 June	379	55	2	3 June	177	—	—
12 "	384	50	—	10 "	167	4	1
19 "	332	54	1	17 "	110	3	7
26 "	526	48	3	24 "	176	3	—
	7,999	1,251	36		3,504	137	26
		1,287				163	

*Mortality : 16.06 per cent.
on admissions.*

*Mortality : 4.65 per cent.
on admissions.*

It was decided in 1917 that the measures which had been found so successful in reducing mortality among heavy draught horses should be extended to include all remounts, consequently, regulations (*Army Council Instruction 1168 of 1917) were issued to give effect to that decision.

Simultaneously, the principle of shipping horses only when, as far as practicable, their temperatures were ascertained to be normal

* Reproduced in Appendix D iii. of this volume.

was applied to animals purchased by the British Remount Commission in the United States and Canada.

It is of historical interest to record that there was, throughout the entire war, no general epidemic of specific influenza or "pink-eye" in the United Kingdom or with the expeditionary forces in Europe. As far as could be determined, nearly every outbreak of pneumonia was of the "shipping fever" type.

In India, however, during the year 1915, there was a very serious outbreak of influenza, which originated at Calcutta amongst freshly landed horses from Australia, and was spread by the distribution of these animals to up-country depots and military stations.

It will be readily understood that, in the course of the operations of the British Remount Commission in Canada and America, where the length of railway journeys and the concentrations of newly bought remounts were far greater than in England, there was more abundant opportunity for investigation of this class of disease. Particulars of this investigation and of the work done in the isolation of a similar organism to that described by Lieut.-Colonel Watkins-Pitchford are fully given in the chapter of this history dealing with the veterinary aspect of the British Remount Commission. The results claimed to have been obtained by the injection of an antitoxic serum for the protection of susceptible animals are worthy of careful consideration.

The complete official reports of Lieut.-Colonel Watkins-Pitchford's investigation into equine pneumonia will be found in the "Veterinary Journal," Vol. XXIV, 1917.

In the treatment of pneumonia, extensive trial was made of every possible form of treatment, including the intravenous injection of solution of formaldehyde, the subcutaneous injection of camphor in oil, as well as the administration of antitoxic serum and many varieties of biological products. With the possible exception, however, of the serum therapy described in Chapter XXI, no system of treatment was discovered that was more efficacious than sheltered open-air accommodation and careful nursing. Nothing was found which could prevent the death of an animal in which gangrene of the lung had developed.

Glanders.†

The incidence of glanders, on the whole, was small. All animals, whether purchased by the British Remount Commission in the United States or Canada, were, as far as practicable, tested with mallein before being shipped. They were again tested on arrival in England, again on issue to units, and again before going overseas.

The complete regulations for testing with mallein in the United Kingdom are given in Army Council Instruction 161 of 1918.*

The United Kingdom thus functioned as a veritable trap for the disease, through which it was difficult for an infected animal to pass for duty overseas.

* Reproduced in Appendix D iv. of this volume.

† These observations apply to the forces under the direction of the Home Authorities, and do not include the Union forces in S.W. Africa, where the losses from glanders were considerable. (See Chapter XVI.)

The efficacy of the measures taken is proved by the remarkable immunity from glanders of the expeditionary forces.

The only outbreak in an expeditionary force of serious importance occurred in the canal zone of Egypt in the Imperial Service Cavalry Brigade from India in 1915.

A few small outbreaks occurred in France but, relatively to the number of animals involved, they were unimportant and were easily stamped out.

The only really extensive outbreak that occurred in the United Kingdom took place in 1915 among the mules in a remount depot in the Taunton district. The disease was introduced by an infected shipload from California. It is interesting to observe that this was the only occasion when serious suspicion was directed to artificial infection by enemy agency, a suggestion to which colour was lent by the simultaneous appearance of the disease in many of the animals soon after landing. No proof, however, was ever obtained.

Many hundreds of animals were exposed to the infection before the disease was got under control, and about 200 clinically diseased animals were destroyed.

Mallein proved to be of little use in controlling this outbreak.

The disease was of the acute fulminating type peculiar to mules and donkeys, with an apparently short period of incubation during which it was not possible to get a satisfactory reaction to ordinary mallein.*

The outbreak was stamped out in an unexpectedly short space of time by means of frequent inspections and immediate destruction of all animals developing clinical symptoms.

A few small outbreaks occurred elsewhere among horses in the United Kingdom, in consequence of open clinical cases being overlooked.

A mistaken diagnosis of strangles for glanders in a veterinary hospital at Kensington, where at the same time a number of animals were affected with strangles, led to the infection and loss of most of the patients there. The number involved, fortunately, was not great.

A similar outbreak occurred from a similar cause at the Curragh.

Apart from the epidemic among the mules at the Taunton depot, however, there were no heavy losses in any one area; and the above instances are given only to show that, notwithstanding the universal use of mallein, it was possible to allow considerable spread of infection through failure to diagnose and at once destroy open clinical cases.

The intra-dermal palpebral method of testing with mallein replaced to a great extent during the war the older subcutaneous method. In France, indeed, the former method became the rule, and towards the end of the war it also prevailed in the United Kingdom.

The advantages of the palpebral method were less bulk and cost of mallein, and a simplified technique in the matter of observation subsequent to injection, which greatly facilitated the work of testing large batches of animals.

* See also page 403.

The complement-fixation test was adopted to a considerable extent by the veterinary services with the British Salonika Force. The animal establishment of this force consisted largely of mules, for which mallein is unreliable. The chapter of this history which describes the veterinary work of the British Force in the Balkans gives particulars of the success that was obtained by means of the complement-fixation method of the diagnosis of glanders.

The same method was also used to some extent by the veterinary services with the British Remount Commission, but ultimately it was replaced by the mallein-eye-disc form of testing, which is particularly well adapted for operations in the Canadian winter.

It seems probable that the complement-fixation test can only be applied successfully on a large scale when the services of a trained bacteriologist, with adequate subordinate assistance and all the resources of a properly equipped laboratory, are available solely for this purpose.

It would also appear to be essential that the area in which control is to be effected by means of a single laboratory is of relatively small extent, so that speedy communications are possible. This condition was fulfilled on the Salonika front, but not elsewhere.

During the first year of the war the mallein required for army purposes was obtained, for the most part, from the Royal Veterinary College in London. It became evident, however, during 1915, on account of the enormous demands for mallein, that arrangements ought to be made for its supply from military sources. Consequently, sanction was obtained for an establishment of one captain, A.V.C., with one civilian laboratory attendant, and two female packers, to carry out the work of mallein production in the laboratory of the Army Veterinary School at Aldershot. By the end of 1915, the output from this laboratory exceeded 50,000 doses a month, at a cost of less than twopence a dose.

The last consignment of mallein from the Royal Veterinary College was received in February, 1916.

Mange.

In the earlier stages of the war, great need was felt for a systematic harmless means of dealing with widespread outbreaks of mange.

In the South African War, although mange had to be dealt with on a large scale, no system of treatment was discovered that did not possess many serious drawbacks. The method largely adopted in that war was that of dressing continuously with a mixture of paraffin or sulphur and a fixed oil; and this system was practised at first in the early stages of the Great War. The results, as a rule, were more or less severe blistering of the skin and grave loss of condition. Much inefficiency resulted from the indiscriminate use of oily dressings in dealing with the widespread outbreaks of mange among the animals of the new armies being trained in the Northern and Eastern Commands during 1915.

It was ultimately established that, when oily dressings were used, horse-fat was the only safe vehicle for the sulphur, that the dressings should not remain long on the skin, and that sufficient intervals between washing-off and re-dressing must be allowed to restore cutaneous function and to prevent dermatitis.

It was not until the very end of the war that the ideal method of using oily dressings was discovered. This method was the alternate use at short intervals of horse-fat and sulphur dressings and hot water and steam baths, whereby the maximum cleansing and stimulation of the skin were effected.

It was found, however, that the most practicable means of dealing with mange on a large scale, under stationary conditions of warfare,* was not by oily dressings but by the use of dips containing, in aqueous solution the poly-sulphides of calcium. The first dip was constructed in No. 5 Veterinary Hospital at Abbeville in France, to the plan of a Canadian veterinary officer.

Dipping as a means of treatment was begun in January, 1916. The principle was that of a long, narrow, deep dipping-bath, with a vertical entry and a sloping exit, in which the mixture of lime, sulphur and water was brought to, and maintained at, a temperature of 42° C. by means of steam. The capacity of the bath was about 3,500 gallons.

The proportions of the ingredients of the dipping mixture were :—

Lime	..	..	..	..	12 lb.
Sulphur	..	..	..	..	30 lb.
Water	..	..	..	..	100 gallons.

In the treatment of mange, the affected animals were dipped two or three times weekly during three to seven weeks, according to the extent of the disease.

Many other dipping baths were subsequently constructed in theatres of war and the United Kingdom.

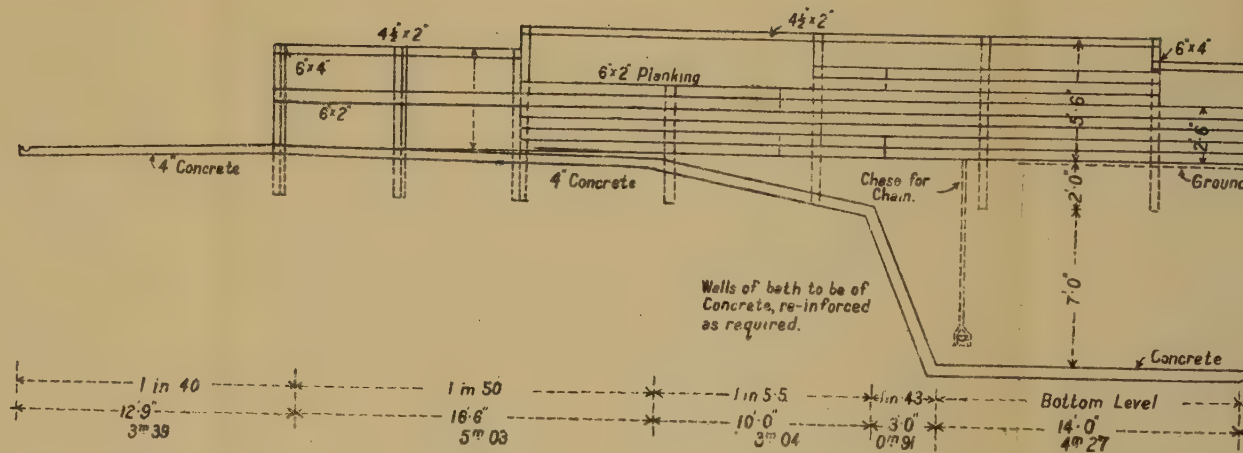
During the first twelve months of the war it was found possible to keep mange well under control ; but, as in other matters affecting military efficiency, veterinary supervision and animal management could not altogether keep pace with the rapid increase in the strength of the army which took place in the years 1915 and 1916. Consequently, mange spread steadily from the autumn of 1915 until March, 1917, when the maximum figures were reached. In that month in France no less than 3·8 per cent. of the animal strength were affected ; 16,624 patients were under treatment in veterinary hospitals.

It is hardly necessary to observe that the incidence of mange rose in winter owing to the long coats and lessened facilities for grooming, and fell in the summer.

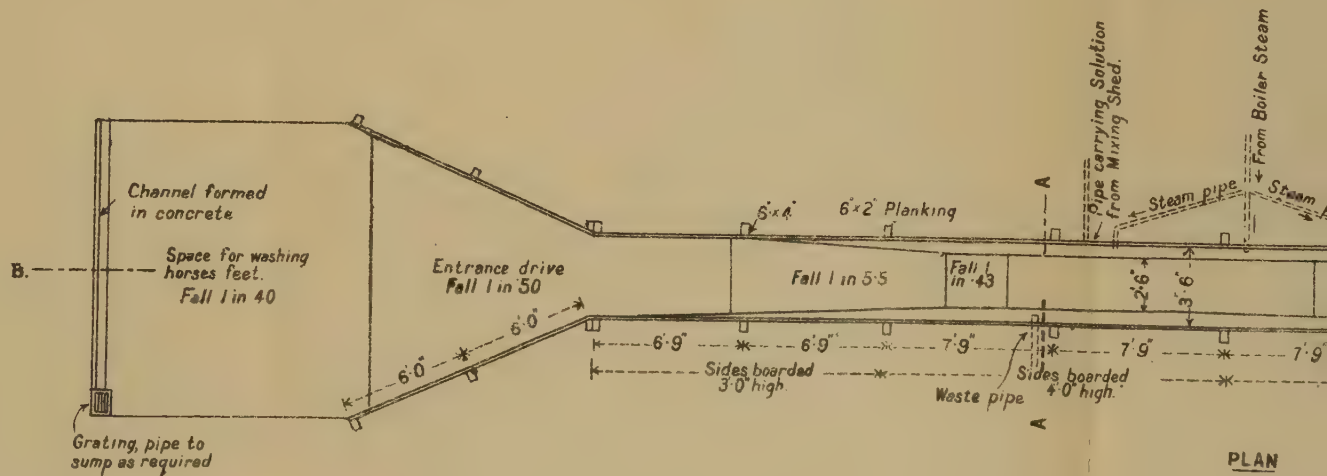
During the summer of 1917 the effects of discipline, training, and experience, on the personnel of the Army Veterinary Service,

* In a war of motion, dips are not practicable except at base veterinary hospitals.

HORSE DIP & ACCESSORY



SECTION B.B.



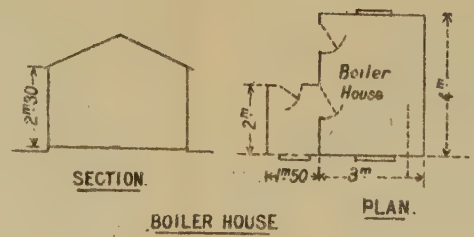
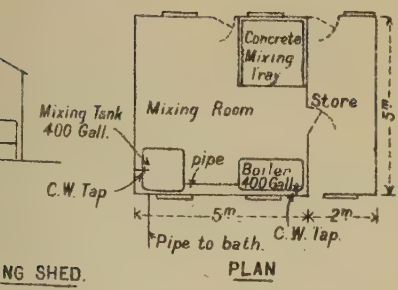
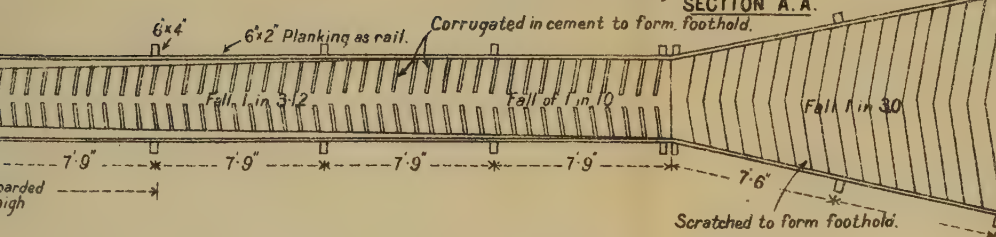
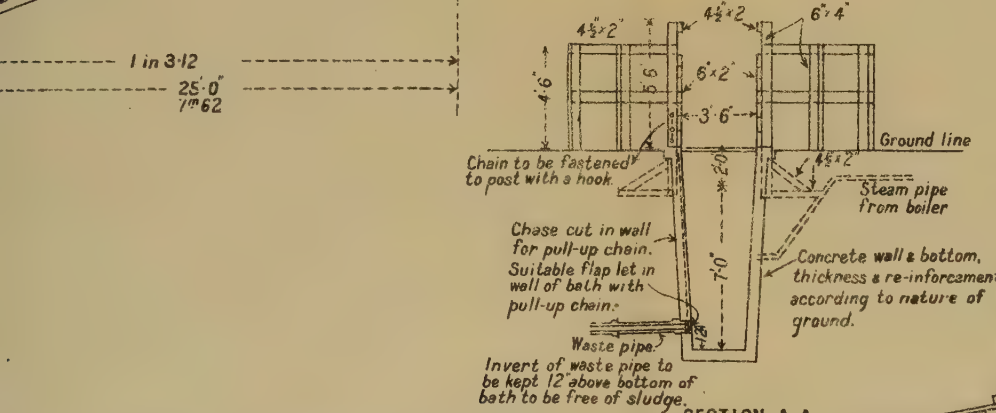
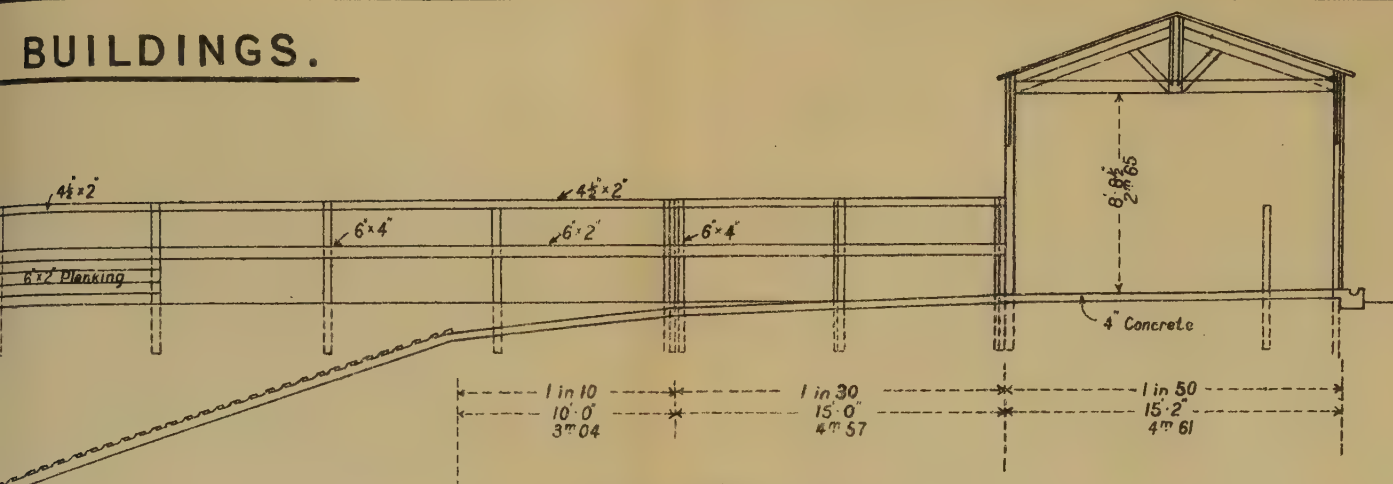
PLAN

Scale for Details - 4 feet to 1 inch.

Inches 1 2 3 4 5 10 15 20 feet

SECTION

BUILDINGS.



as well as on the personnel of mounted combatant units of the new armies, began to be felt. Measures for the adequate control of contagious disease could again be properly enforced, and the new methods of treatment and prevention of mange by dipping-baths were in full working order.

The result was that from April, 1917, onwards the incidence of mange steadily fell until, at the end of the war, the amount of the disease among the animals of the British Expeditionary Force was only .4 per cent.

The measures which were taken for the control of mange comprised :—

- (1) Frequent and regular veterinary and regimental inspection of all animals. An effort was also made to obtain the help of regimental officers of units in this respect (see Army Council Instruction 457 of 1916, reproduced in Appendix D 2 of this volume).
- (2) Immediate segregation of all affected and doubtful cases until seen by a veterinary officer.
- (3) Working isolation, as far as possible, for the apparently healthy animals of an infected unit ; and the prohibition of transfers of in-contact animals to clean units.
- (4) Disinfection of all equipment, etc., under veterinary supervision.
- (5) Evacuation of all affected and suspect animals to veterinary hospitals.
- (6) Disinfection of all horse-transport and railway trucks used for the conveyance of sick horses.
- (7) The erection and constant use of calcium sulphide dipping baths in veterinary hospitals.

In France, dipping baths were, in addition, erected in corps areas, where provision was also made for the disinfection and drying of harness, rugs and equipment. These dips were kept in constant use as far as the military situation permitted ; in-contact animals from affected units were regularly dipped. Full use, moreover, was made of these baths for preventive purposes ; as many as 3,000 animals were passed through one bath in one week.

There remains no doubt whatever that the dipping bath is the chief factor in the control of mange among the animals of an army during concentration and in the field.

Arsenical dipping mixtures were tried and were found efficacious ; but the problem of safely and conveniently disposing of the arsenical solution when it was necessary to change the dip caused a good deal of difficulty ; consequently the calcium sulphide mixture was preferred. A very great deal of work was done in the microscopic examination and identification of the various forms of mange and other parasites found in the skins of horses.

Important evidence was obtained of the part played by the numerous acari found in forage when harboured by the horse.

The susceptibility to mange of mules as compared with horses is slight.

For the first time in British military experience, treatment of mange by means of sulphurous acid vapour was tried. The French and German authorities largely practised this method, but, owing probably to difficulties of technique when dealing with great numbers of animals, it was not generally adopted by the British Veterinary Service in theatres of war or in the United Kingdom. With the British Remount Commission, however, in Canada and North America, where the severity of the winter weather precluded the use of a dipping bath, the method was successfully adopted both for the treatment of mange and the destruction of lice. It was also used in Egypt.

A description of an improvised apparatus is given in the following extracts from a report by an officer of the Army Veterinary Corps in France who had practical experience of this means of treatment:—

Method of Treating Mange in Equines by means of a Sulphurous Acid Bath.

The bath in use is built of mud bricks, and is like an ordinary loose box with half doors in front. At the rear of the building is a sliding ventilator. The top half-door is so arranged that the animal's head comes through, and it is to this that the hood is attached. The hood is made of cloth, and fits round the poll of the animal, and is drawn tight by means of a cord.

Inside the bath is a sliding hip rail, which can be adjusted to the size of the animal admitted for treatment.

SO₂ gas is obtained by burning sulphur in a special arrangement consisting of an oil drum, with an inlet and outlet to which pipes are attached connecting with the bath. The sulphur fire is placed inside the drum, and a blower draws off the air from the bath, forcing it through the inlet over the fire and down through the outlet again into the bath.

The working of the bath is as follows:—

Before a patient is admitted for treatment, the doors and ventilator are opened. The animal is then placed in position, hip rail adjusted, door closed, hood placed round the poll, and the cord drawn up tight. A collarette is placed round the outside of the hood, and any space where gas might escape is packed with tow. Eye goggles may be used, but are not necessary if the animal's head is to the prevailing wind. The head is now fixed by pillar chains, and a manger with a feed placed in front.

When these preliminaries are complete, the ventilator is closed, and the treatment proceeds by pumping in the gas. At the end of the specified period, i.e., one to two hours, the ventilator is opened and gas allowed to escape. The doors are opened gradually, and when the bath is free of the mixture, the collarette and hood are removed, and the animal walks out.

With careful application the animal inhales no gas and does not seem to be affected in any way.

Note: Concentration of gas required—5 to 6 per cent., temperature 90° to 100° F.

A portable type of apparatus for the gas treatment of mange was used in the Germany Army, but on the arrival of the British troops at Cologne an elaborate permanent installation for this

purpose was found and utilized by the Army Veterinary Service. The following description of the apparatus and its working, forwarded by the D.A.D.V.S. at G.H.Q., British Army of the Rhine, to the D.G.A.V.S., illustrates the characteristic completeness in detail of the German technique :—

Treatment of Mange with SO₂ at Cologne.

The gas chambers in use here are not portable ones but fixed and made of cement.

Outside the gas chamber at one side is an accurate weighing machine. On one platform of the machine is placed the gas cylinder in an upright position, and on the other sufficient weight to balance the cylinder. Then a 200-gramme weight is added to the cylinder side. The cylinder is connected by a flexible rubber tube to the entrance pipe in the wall of the chamber.

The animal is brought into the chamber through the back door, which is closed and clamped top and bottom. The reins and the horse's head are passed through the gas-proof hood, and the animal at once is given some hay to keep it quiet. The bridle is removed and hung up in chamber; gas-proof hood tied over head in front of ears and at the throat behind the lower jaw by drawing tight the tapes; front door closed and clamped top and bottom. The hood is made of gas-proof and waterproof indiarubber sheeting.

All harness, rugs, grooming kit, etc., for disinfection are previously hung up in the chamber on special rings fixed to roof and sides.

The animal should have been previously clipped, and if in a state of perspiration rested till cooled down, as it is dangerous to give the treatment to an animal in a sweating condition on account of the absorption of SO₂.

The gas is now turned on and allowed to enter the chamber fairly slowly and the time noted; directly the balance is restored, i.e., when 200 grammes of gas have escaped into the gas chamber (which takes about ten minutes), the gas is turned off and the animal remains in the chamber for a further thirty minutes.

Soon after the gas is liberated into the chamber the animal may show an anxious expression. Remove the horse from the chamber if he starts to sweat and blow. It is advisable to have a fairly large window on each side of the chamber with electric lights inside.

Release the gas by the back door which should not connect in any way with the stable but outside the stable, as this is the only means of obtaining a rapid clearing of the chamber of gas without contaminating the interior of the stable.

After the gas has dispersed, the front door is opened and the animal is walked out.

After an interval of eight days a second treatment is given, and two treatments have been found sufficient.

An attendant should stand at the front door of the chamber during the whole treatment and feed the animal with hay. Better still, a portable manger filled with hay should be placed in front of the door and animal not fed for several hours previously.

The SO₂ gas is put up in two different sizes of cylinders, one containing 50 and the other 100 kilogrammes of gas.

The cylinders are made by the firm of Mannersman, Dusseldorf, and all tested to the pressure of 150 atmospheres before being sold.

The filling of the cylinders is carried out by the firm of Carl Dicke & Co., Chem. Fabrik., Barmen.

The cost of a 50 kilogramme cylinder of SO₂ at the present time is 300 marks—approximately £15 at pre-war rate of exchange—plus the rent of 10 marks per annum for the cylinder. With two treatments for each animal this works out at 2s. 5d. a case.

The following are some extracts translated from "Die Behandlung der Pferderäude mit Schwefeldioxyd" by Dr. W. Noller :—

On account of the action of SO_2 on metals, gas chambers should be separate from operating rooms and clipping sheds. And on account of its great power of expansion (the legal amount allowed to be filled into a cylinder in Germany is one kilogramme to 0.8 litre containing vessel), the cylinder should be protected from the sun's rays and from heat, otherwise an explosion may occur.

Under ordinary pressure of the air, the gas is condensed to a fluid at a temperature of 10.08°C . below zero. This fluid is heavier than water.

To liquify the gas at a higher temperature, a greater pressure is necessary, depending on the temperature.

0°C .	=	1.53 atmospheres.
10°C .	=	2.26 ,,
20°C .	=	3.24 ,,

by which it will be seen that SO_2 can easily be liquified at ordinary temperatures.

On evaporation, 1 kilogramme of fluid at 0°C . and normal pressure gives 349.5 litres gas, or at 20°C ., 375 litres gas.

The weight of a litre of SO_2 gas at zero temperature and 760 mm. quick-silver pressure is 2.8615 grammes. (One litre of air = 1.2939 grammes).

These figures are important in reckoning the amount of gas present. The size of the animal used need not be taken into account, as it only displaces one-tenth of the cell space.

For each cubic metre of cell space, 40 litres of SO_2 gas or 40×2.8615 grammes SO_2 are necessary if the cell is to contain 4 per cent. SO_2 . Therefore 125 grammes ($\frac{1}{8}$ kilogramme) is roughly what is necessary for a gas cell space of one cubic metre; thus, 0.5 kilogramme for a 4 cubic metre cell.

In the army, to make certain, a gas quantity of 150 grammes per cubic centimetre is laid down. This results in a gas-proof cell of a concentration of over 5 per cent.

SO_2 is to be introduced into the cell not in a fluid state, otherwise by splashing a horse a strong effect of cold and eventually inflammation will be obtained. Therefore, the cylinders should always be kept upright.

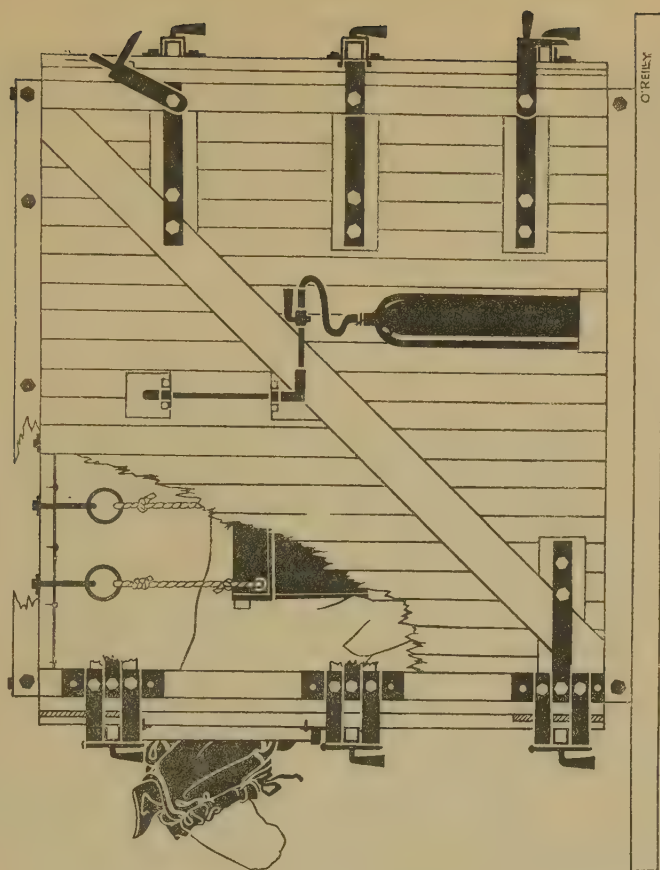
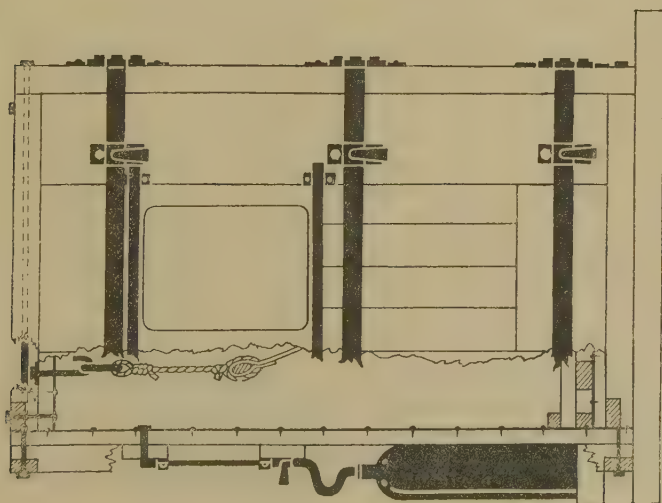
SO_2 is poisonous to man and mammalian animals; with 0.06 per cent. death takes place in six hours, with 0.08 per cent. in 20 minutes. This shows that the poisonous properties of SO_2 should not be under-estimated; but, on the other hand, the penetrating smell, even in very small quantities, is a protection.

Mange parasites are much more capable of resistance to SO_2 than man. At 20°C . sarcopts and their eggs are absolutely killed in half an hour by a concentration of 3 per cent. With the temperature under 10°C ., treatment is doubtful. The keeping up of a temperature over 20°C . is therefore absolutely necessary; also treatment of half an hour, or better, to make certain, one hour. No good results of this treatment are said to be obtained in cold weather unless the stables containing the gas chambers can be kept warm or heated.

The following are therefore the chief points in the treatment :—

- (1) Clipping of the animals. Absolutely necessary and should be carried out the day before or a few days before the treatment.
- (2) Treatment of the head up to the ears with a mange dressing, care being taken to treat the inside and outside of the ears, gullet and muzzle. This treatment should take place at least 24 hours before the gas treatment, otherwise the animal will continually shake and throw his head about, which interferes with the gas-proof hood.
- (3) Bringing the animal into the gas chamber through the back door.
- (4) Shutting the chamber doors, pushing the head through the hood and fastening it by pulling on the two fastening tapes, between which a pad of moist cloth can be placed which will absorb any gas that might escape.
- (5) After screwing up the doors, letting in the gas. For chambers of $3\frac{1}{2}$ to $4\frac{1}{2}$ cubic metres 0.5 kilogramme of gas is sufficient.

Gas chamber for treatment of mange.



Drawn, by the courtesy of the Curator, from the model in the Imperial War Museum.

Ringworm.

Ringworm was so prevalent in 1915 that it became evident that the policy of evacuating cases of ringworm to veterinary hospitals for treatment was impracticable, as sufficient accommodation did not exist. Consequently it became the rule that cases of ringworm, unless they were exceptionally severe, should not be evacuated but treated under regimental arrangements with units. These arrangements ultimately were so complete and efficient that the disease was got under control.

There was no evidence throughout the war that the existence of ringworm among the horses of a combatant unit need adversely affect the working efficiency of the unit for war or hinder movement of troops.

A troublesome circumstance which was frequently brought to notice was the extraordinary rapidity with which ringworm appeared to spread among horses on long train journeys when closely packed in cattle trucks. Animals that appeared, on ordinary examination before entraining, to be free from the disease, or at any rate only slightly affected, were reported, after arrival at their destination 24 hours later, to be heavily infected.

To some extent, no doubt, this phenomenon was due to appearances; the epithelial hair-covered crusts were rubbed off by the friction in the trucks and revealed the obvious symptoms of ringworm. It was, however, maintained by some observers that the warmth and moisture accelerated the growth of the fungus and therefore the development of the characteristic lesion.

Apart from the inefficiency that resulted, practical difficulties arose in the administrative effort to determine whether circumstances or individuals were to blame when complaints were received concerning the arrival of animals obviously and extensively affected with ringworm. Consequently it was decided, in 1915, to make a thorough scientific investigation into this disease, and Lieut.-Colonel Watkins-Pitchford was asked to undertake the work in the temporary laboratory established at Swaythling. The report which he subsequently rendered is summarised in the following account:—

The following observations have been made upon a limited number of animals, such as have become available during the last five months in a depot with a maximum capacity—not often attained—of some 5,000 animals.

It will be recalled that, as a depot for direct overseas issue, Swaythling receives only normal animals in a condition fit, or presumably fit, for re-issue. In spite, however, of this fact, which tends to lighten the incidence of disease upon this depot, the total number of animals sent to hospital suffering from a pronounced form of ringworm during the months (August, September, October, November and December, 1915) has totalled 672, or an average of over thirty animals a week incapacitated from this cause throughout the period. Large as this figure is, it by no means reflects the entire incidence of the disease at Swaythling, inasmuch as treatment upon the various squadron sick lines of the depot is resorted to in all cases where the disease is not considered serious enough to warrant despatch to hospital; while, in addition to this routine procedure, all localized and incipient cases are at once dealt with upon the squadron lines themselves without removal to depot sick lines.

It will be seen, therefore, that the incidence of the disease upon the animals passing through this depot is severe ; and further, that, as the strength of the depot is a constantly varying one owing to admissions and issues, a great part of the disease in question is introduced from outside. In fact, the majority of such cases were sent to hospital within seven days of entering the depot, a period which was found insufficient to admit of a degree of well-pronounced disease even under *optimum* conditions of infection and growth.

The number of cases of ringworm sent sick during the last five months, together with the proportion such cases bore to other hospital cases, is as follows :—

August.	184	cases, being	32·98	per cent. of total cases.
September.	89	„ „	29·48	„ „ „
October.	152	„ „	24·4	„ „ „
November.	170	„ „	36·5	„ „ „
December.	77	„ „	17·6	„ „ „

In addition to these 672 cases, approximately twice as many more have been dealt with upon the depot sick or squadron lines, the great majority of all of such 672 cases having entered the depot in an infected condition. It will therefore be rightly concluded that the disease is widely distributed throughout the various depots issuing horses to Swaythling.

Observations of the above monthly figures tends to suggest that the disease reaches its maximum during the month of November, and thereafter becomes lighter as the season advances. Whether such deduction is warranted by the meagre data afforded by the Swaythling returns or is supported by outside evidence the writer is unable to say, but should such be the case, the observations (*ut infra*) in connection with the length of the coat and the usual seasonal removal of the same, may possibly tend to an explanation of such incidence. While this theory is only tentatively put forward, the tendency of the heavy coat to exert a protective influence can be satisfactorily established.

The desirability of determining some of the more important factors concerned in the propagation of the disease and the manner of its spread, led to the present observations being undertaken. So far as is known, the points dealt with have not hitherto been established.

The wide distribution of the disorder in question—a dispersion and prevalence seemingly incapable of explanation on the grounds merely of physical conveyance of the disease from animal to animal—was one of the early points attracting the notice of the writer, to whom some of these so-called ringworm lesions have hitherto been unfamiliar.

In the light of experimental evidence as to the marked protective influence exerted by the long coat, it would seem that the factor of animal contact has, in the past, received undue weight. In any case, such theory seems inapplicable to those cases of apparently rapid—almost “fulminating”—spread of the disease to horses where no known contact can be traced, and where the eruption is not confined to the usual points of animal contact, but is dispersed equally over both sides of the animal.

No doubt can be entertained as to the actual transference of the disease, either directly from one horse to another or through the medium of infected rugs, stable tools, railway cars, etc. The agency of such things, however, in the spread of the disease appears to have been over-estimated, and the difficulty of infecting a horse with a normal length of coat leads to the conclusion, when considering the etiology of the disease, that some other factor or factors exist which are responsible for its prevalence.

While in many cases coming under notice the actual cause of the infection is obvious, in the great majority of instances this evidence as to a direct cause will be obscure or incapable of demonstration. Extended observation, the writer thinks, will tend to show that such cases—often seemingly sporadic both in origin and in type of lesion—are to be attributed less to material causes of gross contact than to the aerial transmission of infective matter

(spores). Such conclusion, in short, tends to recognise ringworm as coming within the technical classification of an infectious, as well as a contagious, disorder.

In reviewing the more obvious agencies of infection, it has seemed to the writer that the peat moss, now so widely used as a bedding material, must come under suspicion as a means whereby the disease is, at least in part, disseminated. Peat moss constitutes an excellent medium of conveyance and dissemination of the organism of the disease, and, in view of its almost universal use as a bedding material, its significance in the spread of ringworm becomes apparent.

As the parts of the horse which are in contact with the ground when the animal is recumbent correspond to some extent with the areas of actual contact between standing animals, different infective agencies may operate over the same surface. But while both these infective influences—of the ground and live contact—are thus liable to take effect over the same areas, it will be found that involvement of the areas in question is frequent where no live contact has been possible. In such instances the ground, i.e., the bedding, becomes the only medium of transference of the infection, which latter must naturally take place when the animal is recumbent. The number of such "recumbent" cases is greatly in excess of those attributable to possible contact influence, while the localized and densely crowded character of these recumbent areas of infection often suggest a locally acting and defined cause, such as ground pressure would afford, rather than the diffuse infection likely to result from a freely moving infective host.

The possibility of peat moss being a contributory cause in the spread of ringworm will be admitted when it is recognised that the organism of the disease retains its vitality in this medium for a period of at least four months without apparent loss of vigour, and that even admixture with urine, such as would be liable to occur in the stall, does not impair vitality after a lengthy period of contact and the occurrence of decomposition changes.

These facts, when considered in conjunction with the observation that an artificial transference of the disease is not easily brought about, either by actual animal contact under normal conditions or by the use of the infected brush or rug, tend to strengthen the impression arrived at, viz., that the bedding material now in use is, to a considerable extent, instrumental in the production or spread of the disease.

Access of infectious matter to the roots of the hair would seem, in the great majority of instances, to be unattended by actual invasion of the skin unless in the presence of some means of mechanical implantation, e.g., pressure or friction. Cases where the disease appears only upon the areas of saddle-pressure—although the infective material may have been distributed over the whole back of the animal—or the instance where, with two areas equally infected, the disease becomes established only on the area which has been groomed, serve to show that there is some mechanical invasion of the skin of the host by the parasite under observation.

This physical agency is traceable in the occurrence of the disease upon the so-called recumbent areas, an incidence which appears explicable when one considers the factors of warmth and heavy pressure applied to the areas in question during the night for lengthy intervals of time. If to these is added the factor of moisture (which would appear a distinctly promoting cause, such as often obtains in horses' bedding) the best conditions for the establishment of the disease would appear to exist, and inoculation of these recumbent areas would tend to become as effective as is the case in areas brought under the more active agency of saddle-pressure or the grooming brush.

In short, mechanical or physical factors, such as the foregoing, seem highly conducive, even if not essential, to the establishment of the disease.

The tendency of the small discrete form of the disease to assume the larger and more luxuriant type of lesion under the influence of stimulation is a point of interest, as is the difficulty of the removal, by the brush, of all

infective matter from the coat without involving the skin and establishing the infection thereon.

The protective influence of the long coat is undoubted, and the expediency of its routine removal in the presence of a ringworm outbreak appears open to question.

Infection of the coat of a horse is not generally sufficient to establish infection of the skin unless in the presence of some physical influence such as that dealt with above. Where actual invasion of the skin has, however, occurred, the presence of the coat tends to intensify the disease and also to prolong its duration. Removal of the coat over affected areas therefore is, in itself, a remedial measure, possibly associated in part with the devitalizing influence of light.

The loss of protection resulting when the long hair is removed affords similar testimony as to the influence of the long coat.*

Infection of the clipped surface is readily produced, either experimentally or by contact with a natural case of the disease, provided that such contact is close enough to afford the requisite pressure of the opposing surface. In such circumstances the transfer of the disease becomes apparent in about seventy-two hours.

Where, however, a long coat is opposed to the infected surface, such transfer is very uncertain and generally fails to be effective.

The removal of the coat is likely to be attended by risk of infection if the operation of clipping is performed in the vicinity of active cases of the disease, especially under the conditions of infection as laid down above where the clipped skin, after becoming infected, is subjected either to conditions of pressure or of such friction as the grooming brush affords.

In the course of the present observations, no evidence has been secured as to the energy of immovable objects—such as mangers, posts, railway trucks, etc.—to transmit the contagion. Theoretically, no doubt, transference in this manner may take place, but the number of direct instances will be found to be negligible. This may be due to the freedom from irritation which attends the eruption, and the consequent absence of tendency on the part of the horse to scratch or rub against such objects and so create fresh *loci* of infection.

The general freedom of certain anatomical sites (e.g. the belly, limbs, face, etc.) is probably explicable on the grounds of these regions not being "predilection sites" of the disease, such as obtain in many skin invasions of a parasitic and other nature. Freedom from involvement of the head and cheeks is the more remarkable when the factor of pressure or friction from the bridle or halter is considered.

It seems undoubted that a horse's coat may harbour unsuspected the spores of the disease, tenacious but dormant, and awaiting only the stimulation of such physical causes as the saddle or brush. This being so, the adoption of detergent measures, other than grooming, seems indicated in cases where risk of infection may have been incurred.

Such measures will also find their application to these infrequent instances where actual live contact is known to have occurred between a sound and an infected animal.

As details of aetiology and prevention have constituted the main objects of the present observations, it has not been intended to review, or discriminate between, the various agents generally employed in dealing with this skin disorder. The tendency to spontaneous cure of the small discrete form of ringworm-nodule has been frequently noted, especially where the long hair

* This was well shown in the case of a horse which had become extensively affected over the whole side. The animal carried a heavy coat. This latter was removed over one half the affected region. No treatment of the eruption was adopted on the exposed areas, the nodules commencing within a few days to break down and disappear. Fourteen days later the remainder of the coat was removed and the affected areas compared. The eruption under the long coat was found still vigorous and of marked intensity, while the area clipped a fortnight previously was approaching normal in condition and appearance.

has been removed from the site. Nor is the tendency of such forms to spread at all marked.*

Among such scores of artificially produced cases on areas of normal skin, instances of spread from the original focus were rare, a fact attributable, in the opinion of the writer, to the absence of any disturbance, either by grooming or other causes, of the superficial skin elements surrounding such eruptive patches.

Secondary crops of nodules, however, become established on long-haired areas which remain unmolested, and no evidence could be secured as to the establishment of any degree of resistance in the tissue of an area previously invaded, it being found possible to produce fresh experimental patches of infection in close proximity to areas of recent exuberant growth.

Where, however, a patch of discrete nodules was frequently groomed, the tendency to coalesce and spread indefinitely was noted.

In a horse showing a bilateral infection of the small discrete type, the vigorous grooming of one side produced the large confluent form of the disorder, which thus existed side by side with the smaller discrete type.

Stimulation thus appears to be the factor determining the type of tissue eruption following infection; but in the absence of microscopic facilities the possibility of the occurrence of an attendant change in the morphology of the infecting organism could not be determined.

Tendency to remain localized, in the absence of stimulation, is a point of some interest when deciding the question of the removal of the coat; an operation frequently inadvisable on hygienic grounds, and as a remedial measure generally unnecessary.

Hair can with advantage be removed from the vicinity of closely aggregated patches of eruption; this ensures a greater facility in treatment and also tends to shorten the natural course of the disease. Where the eruption is diffuse and extensive, removal of the coat from the body—excepting the legs, if necessary—is often desirable but not, in the writer's opinion, essential either to efficacious or prompt attention.

If the coat of the infected animal can be so treated as not only to remove from it the infectious elements (spores) but to make it, in addition, an unfavourable ground for subsequent infection, treatment of the discrete individual nodules will, in the majority of instances, be negligible. At the same time, removal of the coat will be avoided.

In addition to the foregoing advantages, if the coats of any in-contact cases can similarly be rendered refractory, the spread of the disease will be greatly restricted and the need for precautionary measures lessened.

This treatment of the coat, it is considered, can be effected both with safety and ease by the use of arsenic in solution, either swabbed on, applied in the form of a spray, or preferably by the use of the dip or plunge bath.

In a recent series of observations on the toxic and other effect of arsenical solutions, it has been possible to show the affinity possessed by the skin and hair for arsenic: the hair clippings from a superficial square foot of surface yielding, after frequent dilute arsenical washing or spraying, from four to seven grains of arsenic, while the deeper layers of the skin of the same area (estimated after death) were found to contain from three to four grains, quantities tolerated without disturbance by the system of the animal. The proportion of 1 lb. of the arsenic salt (sodium arsenite containing 80 per cent. arsenic) to 100 gallons of fluid, was the constant strength of the solution producing these results.

That this operation of immersion in such a fluid is not attended with risk, although repeated at short intervals, for even as lengthy a period as 18 months has been shown, nor is risk involved when much stronger arsenical solutions are employed.

* An area extensively involved and denuded of long hair was divided into three sub-areas. Two of these sub-areas were treated with approved applications (one being iodine petrol), the third area was left untreated, and the difference was observed in the progress of the eruption. Loss of vitality and commencing disintegration appeared to affect the nodules of all three areas equally without any remarkable disparity in point of time.

On a *fortiori* grounds, therefore, the infrequent application of such fluid to the horse's coat is a practicable procedure and one devoid of risk.

Actual contact between the skin itself and the arsenical solution is of importance to ensure absorption and to develop within the former a protective influence sufficient to prevent invasion by skin parasites. With the object of assuring this penetration of the skin by the solution, the sodium arsenite is dissolved in, or incorporated with, an emulsion of paraffin. This mixture when sprayed or swabbed on to the skin, or when the animal is immersed in it, penetrates to the roots of the hair even of the densest coat. By this procedure, a highly refractory state of the skin can be produced, while existing points or patches of eruption become rapidly amenable under the influence of such treatment.

Where confluent or exuberant growths exist, frequent applications may be made without risk, if necessary at short intervals, while, in the widely disseminated form of the disease, large areas can be treated and rendered refractory without the considerations of expense and safety which attend some other forms of treatment, such as that with iodine, etc.

Specific Ophthalmia.

This well-known condition was first diagnosed in France in December, 1916. It subsequently became very prevalent, rising at one time to 1·4 of the animal strength.

The disease, which is an irido-cyclitis, or more simply, an iritis, is recurrent and usually ends in blindness from disorganisation of the eye.

Captain Dalling, A.V.C., isolated from the optic nerves of affected animals an organism which he cultured. He claimed to have reproduced the disease by inoculating healthy animals with cultures of this organism. His findings were corroborated and extended by Captain Mettam, A.V.C.

The organism, to which the title of "nerve bacillus" was given is described as a cocco-bacillus, with rounded ends, apparently motile. It stains well with all aniline dyes, is not acid-fast, and is strongly gram negative. It differs somewhat in form with the age of the growth and grows both aerobically and anaerobically. It may be grown in broth, agar, gelatine, and several other media. The organism produces spores, and capsules are present.

The disease is said to have been typically produced in healthy horses at No. 2 Veterinary Hospital, Havre, and at the A.V.C. Bacteriological Laboratory at Rouen, by injections of saline emulsion of a living agar culture into the conjunctiva or the jugular vein.

Cultures were sent to the Central Veterinary Research Laboratory at Aldershot for further investigation and experiment by Lieut.-Colonel Watkins-Pitchford and Captain Minett, but all efforts to reproduce a case of specific ophthalmia failed.

It was concluded, therefore, that either the bacillus completely loses its pathogenicity by transference to a country other than the country of its origin, or that the bacillus employed for experimental purposes by Captain Dalling was not identical with those forwarded to the Central Veterinary Research Laboratory. So far as is known, sudden loss of pathogenic property in pure growths of living bacilli does not occur.

The cultures sent to the Central Veterinary Research Laboratory were pure, and their vitality upon sub-culture was found unimpaired.

It was claimed by some workers that the injection of 1 cc. of Lugol's solution of iodine into the supra-orbital fat cut short the acute stage in the periodical attacks of the disease. The injection was given as a matter of routine as soon as a case was discovered, and this procedure was included in the general policy of control. It is difficult to understand how this treatment could have been beneficial.

Other efforts to control the disease comprised early evacuation of cases to veterinary hospitals, and their subsequent grouping in special wards.

The original outbreaks of specific ophthalmia in theatres of war were almost entirely limited to France and Italy. There is also considerable evidence to show that fresh outbreaks of the disease were limited to certain *areas* in France and Italy. It was observed to a considerable extent on the American continent among animals purchased by the British Remount Commission. It was not observed in its original form in the United Kingdom or theatres of war other than France and Italy.

The inference seems to be that specific ophthalmia is an indigenous and probably a mud-borne disease, of which the contagion is spread by the concentration of large numbers of animals in infected areas.

This explanation would account for its invariable appearance in war on a large scale when remounts are obtained from countries where the disease is enzootic. It appeared, for example, in the South African War, 1899-1902, in which remounts from the American continent and Europe were largely employed. Many of these animals no doubt were already infected. The disease disappeared when the animals were placed in stables with impervious floors.

In the Great War during the military operations in South-West Africa, when only native-born animals were used for military purposes, no outbreaks of specific ophthalmia were reported.

These facts seem to dispose of the theories that the disease is due to the vicissitudes of war generally, or that it is influenced by any artificial circumstances of environment, for example, dark stabling.

It was found practicable to continue to employ on military duties in France a large proportion of the horses which became blind. They were used mostly on the lines of communication, but also in some units in forward areas. The disease is not spread by contact.

Necrotic or Gangrenous Dermatitis.

This mud-borne disease was first observed in the early part of October, 1914, among the horses of the field artillery brigades

employed in the operations on the banks of the Aisne not far from Rheims, where the ground was exceptionally heavy and highly cultivated. Heavy rain had fallen (for the first time in the campaign), and the conditions underfoot were those which subsequently became so familiar.

Diagnosis presented no difficulty, but it was not at first known that treatment would be unavailing and arrest of the epidemic impossible unless dry standings could be provided. In any circumstances, however, treatment of severe cases was impracticable, as, even if the necrotic processes ceased, the subsequent deformity of the foot rendered the animal useless for service.

The epidemic disappeared when shortly afterwards the British forces left the muddy banks of the Aisne for the dry high road and subsequent entrainment for Belgium.

It is noteworthy that despite this ominous and early appearance of the disease, very heavy losses were not subsequently experienced among our animals in operations elsewhere in France, although small outbreaks often occurred.

The disease affected chiefly the heels, coronets and frogs, though sometimes similar lesions were found in the region of the mouth.

The condition is due to a local infection of the subcutaneous tissues by micro-organisms, always including the *necrosis bacillus*. The constant presence of this bacillus suggested that it may have been the actual cause, but this point was not definitely determined, and it is probable that the association of other microbes is a necessary factor of infection.

The fact that the disease in the great majority of cases appeared first in the extremities of the limbs, which are most commonly subject to abrasions and other injuries, suggests that a solution of continuity of the skin is also an essential condition of infection.

The incidence of disease was to some extent seasonal (most cases occurred in winter), but the only essential meteorological factor was wet weather. A thaw after a long frost was particularly productive of the malady; the experience of the British Remount Commission in Canada provided abundant evidence of this fact.

The symptoms occur suddenly; lameness of varying degree is first observed; there is sometimes great pain with complete inability to move the limb.

The local lesion appears as an intensely inflamed area, roughly circular, from half an inch to two inches in diameter. The colour of the skin, best observed in white-legged horses, changes from red to a livid purple as the disease progresses.

Within three days, as a rule, sloughing occurs accompanied by a fetid odour. The slough comprises the skin and more or less of the deeper tissues, and its separation leaves a deep granulating wound with ragged edges.

During the period of necrosis and sloughing there is considerable constitutional disturbance, but in favourable cases this disappears

with the removal of the slough, and the wound acquires a healthy granulating character.

In less favourable cases there is extension of the necrotic processes, which may include the whole of the underlying soft tissues down to the bones and joints, until death takes place from intoxication and exhaustion.

Sequellae include quittor, deformity of the foot, periostitis, and arthritis.

The essential measures of prevention consist in providing dry standings and other means for protection against mud. Other measures comprise the careful dressing of all wounds and abrasions of the limbs with antiseptics in a paraffin or other water-resisting base. No specific means of curative treatment was discovered; all the known methods of dealing with grossly infected wounds were tried, but the success obtained appeared to depend more upon the extent and intensity of the infection than upon the merits of any particular method.

In the present state of our knowledge, the assiduous application of warm hyper-tonic saline solution would most likely be the chosen form of treatment in the earlier stage of the disease, but facilities for this technique exist as a rule only in veterinary hospitals.

It was found that in conditions of active service only the treatment of the less severe cases was practicable.

Among the animals of the British Remount Commission in Canada and North America there were many serious outbreaks of gangrenous dermatitis. A section of the chapter describing the veterinary work of that commission deals fully with the incidence and nature of the outbreaks.

This disease was seen during the South African War, especially on the higher veldt in the Transvaal. It was successfully treated under stationary conditions in South Africa by keeping the animals at rest and placing the affected feet in a nosebag with tow saturated with a 1 in 500 solution of perchloride of mercury.

Ulcerative Lymphangitis.

The losses and inefficiency which resulted from this disease in France were heavy and continuous during wet weather and in certain localities throughout the campaign.

The infection is mud-borne, and is known to be enzootic in many parts of France.

The Army Veterinary Service had practically no former experience of this disease, so that at first there was some difficulty in securing the early diagnosis on which all hope of curative treatment depends. The condition first became prevalent in the summer of 1916, and was the cause of considerable losses during the remainder of the war.

Measures of control comprised the early evacuation of infected animals and their concentration at appointed centres.

The disease processes of ulcerative lymphangitis are insidious, and when animals are covered with mud its early diagnosis is difficult. For some time the only evidence of the disease may be the presence of one or more small ulcers on a limb, and the condition may be firmly established before it is detected.

The number of cases of ulcerative lymphangitis under treatment in veterinary hospitals in December, 1917, exceeded 2,000, and, although after that date the disease showed a tendency to wane, it never completely disappeared.

The disease did not appear in the United Kingdom during the war, and only among a few animals brought home on demobilisation, which were promptly destroyed. It was never observed among remounts in or imported from Canada and America.

Captain E. A. Watson of the Canadian Army Veterinary Corps, who was in charge of the Veterinary Bacteriological Laboratory at Rouen, worked exclusively on this disease for a long time with a view to preparing a curative vaccine. Many different vaccines were prepared and tried, but none gave completely satisfactory results. A considerable amount of success was, however, claimed for the vaccine treatment of this disease in its early stage.

The official report of Captain Watson's work will be found in Volume XXIV of the "Veterinary Journal" for the year 1917.

Contagious Stomatitis.

During the winter and spring of 1917 there were large outbreaks of contagious stomatitis among army animals in France. In one month there were 2,596 cases under treatment in veterinary hospitals.

Energetic measures of segregation and disinfection were taken, and by the end of May, 1917, the disease had almost disappeared.

No extensive outbreaks occurred in other theatres of war or in the United Kingdom, but the Veterinary Services with the British Remount Commission in Canada and North America had much trouble with a form of contagious stomatitis which may have been identical with the disease observed in France. It was seen in the South African War, especially in remount depots in Cape Colony.

The condition, as it occurred among the animals of the British Expeditionary Force, is described in detail by Captain A. C. Burton, A.V.C., in Volume XXIV of the "Veterinary Journal" for the year 1917.

Epizootic Lymphangitis.

It is probable that the comparative freedom of British army animals during the war from outbreaks of epizootic lymphangitis was largely due to the keen clinical outlook for this disease which was kept by all officers of the Army Veterinary Service. The

experiences of the outbreaks which followed the South African War were fresh in the minds of all concerned, and no chances were taken with any sort of suspicious ulcer.

The first case of epizootic lymphangitis that occurred among the animals of the British Expeditionary Force in France was reported on September 14th, 1917. From that date to February, 1919, only 202 cases were diagnosed. Of this number, 80 cases were diagnosed among the animals of the 2nd Life Guards, necessitating the withdrawal of that regiment into complete isolation until the disease was stamped out.

The system of control depended for its efficacy on early diagnosis and the immediate destruction of affected animals. The spread of the disease was restricted by the modern scientific system of dressing wounds practised by the trained A.V.C. staff. In previous wars, when the treatment of animals was carried out under regimental arrangements, the disease, when it once obtained a footing, was inevitably spread.

It is suggested, in the chapter on the work of the Army Veterinary Service on the Salonika front, that a system of routine wound dressing by turpentine and creosote and petrol in a fixed oil had much to do with the freedom of the animals from epizootic lymphangitis on that front. The figures given, showing the immunity from epizootic lymphangitis of the animals of the British force as compared with those of the Allies are remarkable, and can only be attributed to the effect of a special means of prevention, which may well have been the routine wound treatment which was adopted.*

Battle Casualties on the Western Front.

The animal wastage from battle casualties during the period of the retreat from Mons was not accurately determined, but it was, in relation to the total number of animals, not great.

During the first two years of the campaign in France the animal wastage from this cause was very low.

When offensive operations began in the summer of 1916, the casualty list rose considerably. The following table gives the figures for the period July–December, 1916 :—

	Killed or Destroyed.	Wounded.	Total.
Gunshot Wounds	3,941	6,063	10,004
Gas	33	352	385

The casualties in France during the first four months of 1917 (including the operations before Arras) were :—

<i>Killed or destroyed.</i>	<i>Wounded.</i>
2,847	3,815

* See page 281.

The casualties for the remainder of the campaign in France were :—

Period.	Chief Operations.	Gas.			Gunshot Wounds.			Total.
		Killed.	Wounded.	Total.	Killed.	Wounded.	Total.	
1st May to 27th Oct., 1917.	Messines & operations in Belgium	68	1,138	1,206	10,590	22,258	32,848	34,054
28th Oct. to 16th Mar., 1918.	Operations at Cambrai	6	33	39	4,096	8,869	12,965	13,004
17th Mar. to 14th July, 1918.	Period of great hostile offensive ..	78	451	529	14,122	13,154	27,276	27,805
15th July to 11th Nov., 1918.	Period of great British offensive ..	26	246	272	22,500	23,251	45,751	46,023
Total ..		178	1,868	2,046	51,308	67,532	118,840	120,886

During the first and greater part of the campaign in France it was the custom to inject all wounded animals with a prophylactic dose of anti-tetanic serum. Investigation, however, subsequently showed that the incidence of tetanus was too infrequent to justify the cost of this procedure as a matter of routine ; consequently the custom was discontinued.

Experience showed that casualties among animals could be lessened by such military measures as the careful location of horse-lines and the judicious distribution of animals in small groups.

During the summer of 1918 a considerable proportion of the gunshot wounds among animals were caused by aerial bombs. Successful preventive measures comprised the erection of mud walls, five feet high, around the horse-lines or stables.

In the more permanent stabling on the lines of communication, traverses were added between every fourth and fifth stall ; this greatly reduced the destructive effects of direct hits.

Prolonged and careful trial on a large scale was given to the attempted protection of animals from gas warfare by means of horse-respirators. Respirators of a suitable type were obtained and issued to field units on a basis of 33 per cent. of their animal strength. The arrangements, however, were found to be impracticable for the following reasons :—

- (1) The chlorine gas which the respirators were used to defeat was replaced almost entirely by mustard gas, against which they were useless.

- (2) The protection of the horse must be a secondary consideration to that of the man ; the latter first adjusts his own respirator, and, by the time this is done, it is too late to protect the horse.
- (3) The casualties among horses exposed to the chlorine gas attacks were, in fact, so few that the heavy work and expense of maintaining respirators for use in special emergency could not be justified by results.

Accidental Injuries.

Accidental injuries to animals included contusions, sprains, fractures, rope galls, harness galls, saddle galls, bit injuries, girth galls, brushing, and puncture of the hoof by nails, etc.

With the exception of the last-named, these injuries are, for the most part, preventable by careful animal management, i.e., by constant attention to the welfare of animals at all times.

The relative freedom of British army animals during the war from inefficiency due to preventable injuries is the best evidence that can be given of the care that was taken.

One of the most constant causes of inefficiency among army animals in France during the second half of the war was injury to the foot from picked-up nail.

During the winter of 1915-16, admissions to veterinary hospitals on account of this injury began to average 400 a week, and during the following winter the average rose to 530. In exceptional weeks there were more than 800 admissions.

The remarkable increase in this class of injury was due to the use on a large scale for the first time in military history of regimental field-cookers, which used wood from packing cases, complete with nails, for fuel.

Contributory causes were the settled conditions of trench warfare, in which re-filling points were located at the same places for months at a time, and the intensity of winter mud, causing the horn of the horses' feet to become softened and allowing the nails easily to penetrate to the sensitive structures. The part played by mud in masking the condition is self-evident. Quittor was a common result.

The French nail used in making packing cases was the usual cause of injury ; horse-shoe nails were sometimes the cause. Among the less frequent causes were cartridge cases and the manufactured "crows feet" scattered by the retreating German army.

Every sort of expedient to prevent wastage from picked-up nail was tried. The measures which proved useful were :—

- (1) The publication of orders and notices asking all ranks to help in the work of removing loose nails to safe places, including specially marked wooden boxes which were widely distributed for that purpose.
- (2) The opening of packing cases on ground likely to be used for horse transport was prohibited.
- (3) The organisation of "nail hunts" by units.

Experimental measures which proved to be impracticable were :—

(4) The use of metal plates to protect the sole and frog of the horse's feet.

(5) The use of electro-magnetic machines towed behind motor lorries.

The weekly incidence of picked-up nail cases dropped to 425 in 1918, but it would no doubt have again risen had the war been prolonged during the following winter.

Vaccines and Sera.

With the exception of ulcerative lymphangitis for which vaccination was to some extent remedial, it ought to be recorded that there is no evidence of any important success having been obtained by the use of vaccines for the veterinary treatment of wounds or diseases during the war.

It cannot be disputed that here and there in isolated cases a careful worker may have accelerated the recovery of a tedious suppurating condition by hitting upon an appropriate vaccine; but this circumstance, if it occurred, does not affect the historical truth of the above generalization.

Whatever the future may hold in store for veterinary vaccine-therapy in war, and it may hold much, the clinical observations of the war under consideration suggest little advance in this form of treatment.

For the first two years of the war no restriction was placed upon the purchase and use of the many varieties of proprietary vaccines and sera prepared by commercial firms of chemists in England and America, but at the end of that period it was thought necessary, for reasons of economy, to call for reports on the results obtained.

Ample time and every facility were given for the preparation and submission of these reports, but a careful examination and analysis of them when received showed plainly that the consensus of experienced opinion was adverse.

There was in these reports no evidence of any scientific value to show that the use of commercial vaccines or sera, either in wounds or in catarrhal or respiratory affections, of the horse, arrested disease or accelerated recovery. Consequently the decision was taken not to spend any more money on these substances.

At the same time every effort was made to stimulate research in military veterinary laboratories into the possibilities of vaccination; but as stated above, with the exception of ulcerative lymphangitis, no important results were obtained so far as curative treatment by this means was concerned.

It ought also to be recorded that the successful results obtained in the vaccine treatment of ulcerative lymphangitis were limited to early uncomplicated cases which had not been subjected to the deleterious action of powerful antiseptics.

The results obtained by veterinary workers with the British Remount Commission in the treatment of shipping fever by freshly prepared anti-toxic serum appear to provide some evidence that, under proper conditions, sero-therapy may be curative for this type of pneumonia. In the practice of sero-therapy, however, due consideration must be given to the danger of anaphylaxis, not only as a potential cause of death, but in its subsequent far-reaching effects in retarding convalescence. It was shown clearly in the large scale operations of the veterinary service with the British Remount Commission that in veterinary, as in human medical practice, the utility of sero-therapy is, in the present state of our knowledge, sometimes limited by phenomena that are difficult to control. It must be carefully noted that the results claimed for sero-therapy in the work of the British Remount Commission coincided with a period when the general arrangements for the medical care of sick animals and the management of healthy animals had been brought to a high standard. The observations were made during the year 1918, after everything possible had been done not only to improve the conditions in the remount depots and veterinary hospitals, but to ensure the care of animals during transportation by rail. Consequently it is reasonable to suppose that disease, when it did occur, had not the force of former years when circumstances favoured "massed infection."

The immunization of cattle exposed to rinderpest infection, both in Egypt and in Mesopotamia, by means of serum was largely practised. Large quantities of anti-rinderpest serum and syringes were also supplied to the South Russian Forces to assist them in their efforts to control the disease.

Veterinary Police Measures.

The Army Veterinary Service had constantly before it the important duty of preventing the spread of contagious diseases of animals from military to civil areas.

The larger questions of policy included that of opposing as strongly as possible all proposals to bring back to the United Kingdom officers' chargers and troop horses during the war from countries in which such diseases as epizootic lymphangitis prevailed. Complete agreement on indisputable scientific grounds existed between the veterinary authorities of the War Office and the *Board of Agriculture so far as this policy was concerned. This unswerving unanimity of opinion prevailed against the advocates of a sentimental and selfish policy, which would have almost surely reintroduced epizootic lymphangitis and probably other contagious diseases into the British Isles.

The question was raised several times, and it was not an easy matter to maintain a firm front to the urgent and influential representations that were made on behalf of officers who wished, very naturally, to repatriate their horses.

* Sir Stewart Stockman, the Chief Veterinary Officer, represented the Board of Agriculture in these matters.

Scientifically, of course, it would have been possible to safeguard the country against the introduction of contagious diseases of horses by means of quarantining an imported animal for the necessary period of six months. Facilities, however, did not exist during the war for holding animals in proper quarantine for such a long period under complete veterinary observation. The State could not afford either the cost or the time of the technical personnel that would have been required for the purposes of quarantining.

Complete agreement between the military and civil veterinary advisers of the Government also was found in the measures that were taken to prevent the spread of contagious diseases from army horses and mules in home stations to civilian-owned animals. Agreement in policy, however, though desirable enough, cannot of itself produce results. The circumstances of the military training and quartering of troops in the United Kingdom for the first two years of the war were not favourable to veterinary police measures. Mounted units were billeted at farms and in rural areas all over the country. Army animals were quartered in the same stables as civilian-owned animals, ate from the same mangers, and drank from the same troughs.

Notwithstanding this agreement in policy, therefore, the Board of Agriculture during the first two years of the war often found it necessary to call for the military investigation of allegations against those in charge of army animals for not taking steps to prevent the spread of infection. The investigations usually showed that circumstances, and not persons, were to blame.

Army Council Instruction 174 of 1916* states in detail the measures that were to be taken to prevent the spread of contagious diseases from army horses and mules to horses the property of civilians.

Apart from the effect that the publication of these instructions undoubtedly had, it was found most useful as evidence which could be produced to satisfy agricultural associations and others who might be disposed to prefer charges of negligence and ineptitude in this respect against the military authorities.

The publication of such instructions as a reminder to all concerned is in fact a necessary measure of veterinary police at the beginning of a war.

A difficulty that arose on a large scale for the first time in military veterinary experience during the war was that of adjusting compensation claimed by civil inhabitants for the alleged infection of their stock by army animals quartered in their vicinity. Most of the claims were for deaths for pneumonia and for loss of time and depreciation of the value of working animals that became infected with strangles and catarrh. Inasmuch as the type of pneumonia which prevailed among army horses was not proved to be infectious in favourable circumstances, a claim for death from that disease was a difficult matter to settle, and more especially when, among

* Reproduced in Appendix D 1 of this volume.

the army horses alleged to have transmitted the infection, there was no record of a case of pneumonia.

It was of course indisputable that a good deal of strangles and catarrh prevailed in mounted units recently furnished with remounts, and that these primary infections might be, and probably were, transmitted to the animals in respect of which the claims were made.

Oversight on the part of the owner thereafter in working an animal suffering from strangles or catarrh might lead to the development of fatal pneumonia, and to this extent the claim was justified.

Moreover, respiratory affections are not rare among farm horses, and it was by no means always clear that any infection had been conveyed by army horses. For instance, in one case of claim by a farmer for compensation in respect of sickness and mortality throughout a period of a year, it was established that every instance of sickness or injury among his animals during that year was embodied in his claim. It was brought out in evidence that in preceding years, for which no claim could be made, the bill of the veterinary practitioner who attended his animals averaged £10 annually, but that in the year in which the claims were made no casualty occurred, except as the result of military quartering, which required the professional services of the practitioner.

It is interesting to reflect that no claim was ever made by the Army Council for the infection of army animals from civil sources ; it was always the other way about.

Foot-and-mouth disease was prevalent during the war in army areas in France and Belgium. This prevalence was due, in part, to the interference with civil sanitary administration, which is an inevitable consequence of military operations and, in part, to the mobilization for active service of most of the French and Belgian veterinary practitioners who in peace would have been employed in controlling the disease.

The British Army Veterinary Service did everything possible to assist the French and Belgian Ministries of Agriculture in these difficulties, both in administration and personnel.

The Mission Militaire Française kept the Director of Veterinary Services informed concerning outbreaks of contagious disease, and the latter arranged, as far as possible, for the necessary advice and assistance to be given by officers, A.V.C., to the civil inhabitants in the affected areas.

Special measures were taken to prevent the introduction of the disease into the British Islands by the agency of individuals and material.

A General Routine Order, first published in August, 1915, and repeated thereafter, stated in detail the precautions that were to be taken.

The difficulties of control in Belgium were intensified at the time of the Armistice, and afterwards, and during the period that elapsed between the retreat of the German army and resumption of administration by the Belgian authorities ; concerted measures

were taken by the Belgian, French and British veterinary authorities to combat the spread of contagious diseases.

In addition to the services of personnel, disinfectants were supplied on repayment from French and British military sources.

The really great efforts that were made on demobilization to prevent the introduction of contagious diseases into England in the course of the repatriating of army animals come properly under the heading of veterinary police measures.

The essential measures of precaution that were agreed upon between the civil and military veterinary advisers of the Government comprised the following provisions :—

- (1) Only army animals in France and Belgium to be returned to the United Kingdom, as a general measure.
- (2) Animals to be held in quarantine in the United Kingdom for at least fourteen days under close clinical observation before being offered for sale to the public.
- (3) The mallein test to be applied at least twice to all animals before final disposal.

These conditions were duly fulfilled. Quarantine stations, to which the necessary personnel for veterinary duties were allotted, were established at various centres in England ; and among the many thousands of animals disposed of no outbreak of contagious disease occurred.

A novel problem was that of bringing safely to England a number of dogs which had been acquired by individuals of the British army in the theatres of war. In many instances the owners had become greatly attached to these dogs, and it was decided to allow a proportion of them to be brought to England, subject to proper precautions.

The army veterinary service was in no way sympathetic towards the return of large numbers of these dogs, but the matter was pressed by the demobilization authorities and, after much consideration, a scheme was drawn up on the following lines :—

- (a) The provision of small R.A.V.C. units at the principal ports of embarkation to whom all dogs of troops coming home would be handed.
- (b) The construction of one or more quarantine depots in the United Kingdom which would receive all dogs from the R.A.V.C. units at ports of embarkation.

The procedure to be adopted was that the reception units were to receive any dogs from officers or soldiers wishing them to be repatriated, and on receipt of the quarantine fees (estimated at £8) the dogs would be sent in batches under the care of R.A.V.C. personnel to the quarantine stations, where they would remain until the conclusion of the quarantine period.

A site was selected and the R.E. services were asked to estimate for a depot on the basis of 2,000 dogs.

Owing to the heavy cost of material, etc., the provision of such a depot was estimated at from £25,000 to £30,000.

The matter was put before the Army Council on August 7th, 1918, and they ruled that the expenditure of neither labour, money nor material could be approved.

The R.S.P.C.A. then came forward on November 18th, 1918, with an offer to undertake the cost of quarantining a number of dogs up to 500. This was accepted by the Army Council, subject to the concurrence of the Board of Agriculture.

After discussion with the Board, the following scheme was adopted :—

- (1) The R.S.P.C.A. to make special arrangements with the Dogs' Home, Battersea, to erect new kennels at their quarantine stations at Hackbridge to accommodate the dogs during the period of quarantine.
- (2) Licences for a definite number of dogs, to be allotted to General Officers Commanding the Forces in each theatre of war for distribution, with due regard to those having the greatest claims for repatriation.
- (3) Dogs to be brought from the ports of embarkation under the care of the R.A.V.C. and handed over by them to the quarantine depot at Hackbridge.
- (4) A nominal fee of £2 to be charged to the owner of each dog, to be paid to the R.S.P.C.A., who undertook to bear all further expenses.

The allotment to different theatres was as follows :—

France	..	..	..	450
Salonika	..	..	..	25
Egypt	..	..	..	15
Italy	..	..	..	10
				<hr/>
				500

Details of the scheme were sent to the different theatres on January 29th, 1919, and the first batch arrived from France on February 24th, 1919.

On the whole the arrangements were carried through satisfactorily, and nothing untoward transpired.

CHAPTER XXIV.

ANIMAL SURGERY OF THE WAR.

SURGERY in war time in relation both to man and animals is necessarily practised under conditions very different from those existing in peace, but the veterinary operator has a great advantage over his medical confrère in that the surroundings in which he has to work are not entirely strange to him.

As a veterinary practitioner he has often been compelled to improvise not only in regard to the material for casting and securing the animal, but also the arrangements for the operating bed and lay assistance. Consequently he knows from experience that if he can only obtain an ordinary wagon rope and can find a grass field or the wherewithal to make a soft bed upon which to secure his patient the rest is easy, provided that he has with him some chloroform, the regulation army veterinary officer's surgical equipment and the ability to use the instruments contained therein. It is true that special operations need special instruments, but it is astonishing how much good work can be done with the aid of a scapel and dressing forceps, a few pairs of artery forceps, a razor, director, scissors, and a needle and silk.

The Great War gave a notable opportunity to the younger members of the veterinary profession to exercise their skill in surgery, and the opportunity was fully taken, not only to their own advantage but to the great benefit of their animal patients and the relief of the taxpayer, whose purse provided for the original purchase of the necessary animals and their replacement when no longer of any use for military purposes.

In this field at any rate the quack was not tolerated, and the properly qualified veterinarian came into his own, the result proving beyond question the value of scientific training.

Before any major surgical treatment was undertaken every individual case had to be considered on its own merits; firstly on grounds on humanity, and secondly with regard to the present and future economic value of the animal and the prospect of its future military usefulness, the probable length of time before convalescence would be complete being taken specially into account.

It is obvious how large a part experience must play in deciding these questions and how important it was from an economical point of view to include in the personnel of veterinary hospitals officers who not only had a definite aptitude for practical surgery, but had sufficient experience in this branch of veterinary science.

The quitor may well be taken as a type of surgical case that required experience in prognosis as well as natural dexterity in operative procedure. In the earlier stages of the war it happened by force of circumstances that considerable numbers of these cases were in the professional care of officers who had never attempted the

operation for quittor and had no aptitude for intricate surgery. When officers became available in sufficient numbers to permit of special appointments, men of known surgical experience, including regular and territorial force officers, and practitioners from civil life, were allocated to veterinary hospitals, with the result that the increase in the percentage of recoveries was marked. The improvement was progressive as younger officers with a liking for surgery were found and trained by the older men not only in the operation for quittor but in the surgical treatment of other serious conditions.

At the front itself comparatively little operative procedure of a major nature could be undertaken as a routine measure. The exigencies of war required that any animal that was likely to be laid up for any length of time should be evacuated to a hospital on the lines of communication, where proper accommodation was provided for it. Nevertheless many of the mobile sections did useful work during the delay that often necessarily occurred pending evacuation of the cases, by taking surgical measures to prevent the development of septicaemia or other wound infections.

Each hospital had its own operating theatre. In many instances this was excellently constructed, and the veterinary officers who had the good fortune to be appointed to the surgical wards had much greater facilities than they had ever had before whether in military or civil practice.

The operating beds were of various composition. In some hospitals the bed was a mattress consisting of a tarpaulin or leather container filled tightly with straw. In others it was clean straw, sand, bracken, or other basis, over which a tarpaulin was spread. In the later stages of the war special operating tables were constructed, of which the best type was that devised by Captain W. M. Lang in Mesopotamia (see plate facing page 324).

Preventable Injuries.

The great majority of the surgical cases that occurred in France and Belgium were due to kicks. The circumstances of trench warfare on a great scale made it impossible to give the animals, especially those of artillery units, the exercise necessary to subdue their energies and to promote the harmony with each other which is best effected by regular work.

The exigencies of war necessitated that large numbers of animals strange to one another should be grouped together in restricted areas and tied up in all sorts of positions to which they were unaccustomed. The discomfort of their surroundings induced a peevishness of disposition that, fostered by lack of exercise, found vent in more or less vicious attacks for which every facility to injure was given by the propinquity of the picket line method of attachment or the crowded accommodation in covered buildings.

In these circumstances the squeamish mare was a special danger. Fractures and severe contusions were of daily occurrence in all divisional areas. The treatment of these conditions was necessarily

destruction of animals that were the subject of fractures, and simple surgical first-aid in cases of severe wounds and contusions pending evacuation to hospital.

The Treatment of Wounds at the Front.

It can be readily understood that, although the principles of antiseptic wound treatment may be the same in times of war as in times of peace, there are in the former circumstances many extra difficulties to be overcome in the methods of application. There are also the questions of space and transport to be considered, and for this reason one is forced to rely upon the antiseptics and disinfectants which can be reduced to portable form. Naturally, too, when thousands of pounds are involved, the question of expense becomes a consideration. For this reason the tablet form was generally adopted, and drugs like perchloride of mercury found a very useful place. Iodine, too, carried in tubes and accompanied by a small tin of spirit, was supplied in the veterinary officers' and unit chest, being used particularly for certain classes of wound injury. Clean water was often difficult to get, and continuous watery dressings in the field units were often not possible. A satisfactory first-aid dressing consisted of :—

Camphor	..	..	..	..	..	3i
Creosote	..	..	..	..	..	3ii
Ol. Tereb	..	..	..	..	..	3ii
Ol. Rap. ad	..	..	..	..	..	3x

To this, on the Salonika front, Brigadier-General Eassie added with advantage 10 per cent. of petrol. Applied with the aid of a bandage, where the latter could be affixed, it proved a godsend for wounds of the limbs in wet and muddy weather under the trying climatic conditions in which the sick horses had to be placed whilst awaiting their removal to the hospitals at the base. It was an old-fashioned remedy but proved to be exceedingly useful. It was comparatively easy for a man to dress a large number of cases in a very short time, and the effect of the oily application was better and more lasting than a lotion made with water. It was astonishing how the dressers would adapt themselves and find ways and means, even in severe foot cases, to make their patients comfortable, and too great credit cannot be paid to what was done by the serjeants A.V.C. in rendering first-aid to their patients under the trying conditions under which they were placed. During three-fourths of the year the horses in France were in mud up to the knees and hocks, and it was difficult generally to find a dry place where one could put even the foot cases. In the field the conditions under which the patients had to be kept, until they could be sent to the mobile section hospital, necessarily varied with circumstances. The mobile veterinary hospitals were located, if possible, in or near a farm where buildings were available and could be utilised, so that the worst cases could be kept under shelter.

Shell and Bullet Wounds.

These were of particular interest to those who had no previous experience of these kinds of injury. In many instances the bullet passed through the body or a limb leaving a clear cut hole which did not interfere with the utility of the animal and healed without complications. Unless it hit a vital organ or came in contact with bone the stopping power of the pointed bullet was often of little account, but if a bone was struck or if the wound was caused by shrapnel or a soft-nosed bullet the effect was more serious.

On the post-mortem examination of a bone it was easy to distinguish the point of entrance from the point of exit; this difference was as well marked in flat bones such as the scapula as in the larger round bones of the limbs. The point of entrance appeared generally as if drilled with an auger whereas the point of exit was shattered. Depending upon the velocity of the missile the largest bones might be completely shattered or it might be found that a bullet had entered the bone a certain distance and remained there without passing through it.

Shell and bullet wounds naturally demanded special treatment depending on the size, situation, and character. Some of the wounds inflicted by pieces of shell were enormous, and when a bone of the leg was fractured, or a vital organ was involved, immediate destruction was the only proper and humane course to adopt. Similarly, where the wound was not of an obviously fatal nature, but was so large that its treatment could not be justified on economic grounds on account of the time it would take to heal, the only proper course was to destroy the animal.

When the case was of a more hopeful nature the first step in its treatment was that of searching for the foreign body with a view to its surgical removal. Wounds caused by and still containing pieces of shell gave much trouble, often leading to death from septicaemia, with or without the development of gas gangrene. It was often impossible to discover the contained piece of shell, particularly if it was embedded deeply in a muscular part or had taken an erratic course in its passage through the tissues.

An example of the crooked course of a bullet is given in the following quotation from an article by Lieut. E. H. Wylie, A.V.C., in the "Veterinary Journal" for the year 1915:—

"We were sheltering from aeroplane vision by the side of a wood when a German shrapnel shell burst on percussion among the trees, killing four horses outright (all thoracic wounds) and wounding ten others, two of these so severely that I shot them immediately. Of the others one had a bullet wound on the near side of the neck, just where one usually injects mallein. It entered here and passed through to the other side as far as the skin and then became deflected downwards over the shoulder and along the thorax leaving its course clearly demonstrated like the weal produced by the cut of a whip.

"By palpation I traced this with my hand as far as the fourteenth or fifteenth rib where I could distinctly feel the bullet rolling about subcutaneously. From this situation I removed it with a scapel quite readily. Further progress of the case was uneventful, and a careful search over the horse's body revealed no trace of a wound elsewhere."

The same officer reported the peculiar effects of a shell wound in which :—

“The anus itself of a mare was completely excised as perfectly as if by the surgeon's knife, while the tail, vagina, and buttocks were entirely uninjured. This animal must have been in the act of defaecating when hit by the piece of shell. The horse lived for about four days and was then destroyed, the piece of shell (about 3 inches by 2 inches) being found on post-mortem examination in the region of the mammary gland. The missile must have been deflected immediately upon entry as there were no other wounds anywhere on the body.”

Wounds of the loins, usually penetrating from above, were dangerous on account of the gravitation of pus towards the abdominal cavity. For these cases the bismuth iodoform paste* (B.I.P.P.) proved most useful and when applied early enough saved many patients. This preparation was first publicly brought to notice by Dr. R. Morrison, Professor of Surgery of Durham University, in an article in the “British Medical Journal” of October 20th, 1917. Shortly afterwards, particulars of the method were circulated by the Veterinary Directorate of the War Office with a view to its trial in the treatment of wounds of horses. The results were very satisfactory. The “Veterinary Journal” for May, 1919, contained an interesting article on the use of this paste by Captain E. S. W. Peatt, R.A.V.C. Particulars were given in this article of a series of 50 cases extending over three months with only two failures.

Some of the wounds healed very rapidly, and he quotes by way of illustration that the duration of the healing of quitters was about three weeks, and that foot cases in general did well. Before applying B.I.P.P. to a wound, the latter is thoroughly cleansed, either with petrol or spirit, and afterwards made as dry as possible, immediately before the paste is applied. It is of no use to apply it immediately after an operation if there is much surface haemorrhage; in cases of this kind the wiser plan is to apply some ordinary antiseptic under a bandage and then re-dress the wound properly in twenty-four hours with B.I.P.P. Every crack and cranny should receive a thin application of the dressing, and if the wound is sutured, a little should be smeared outside as well as inside. A very little suffices, and another great advantage is that it is not necessary to re-apply the dressing oftener than at intervals of five or six days, or even longer. It is non-irritant to the tissues, and in a large animal like the horse there is practically no danger of iodoform poisoning. As compared with other remedies, its cost is not prohibitive when used with ordinary care, and Captain Peatt in his article makes a comparison between the treatment of patients with eusol and with B.I.P.P., to the advantage of the latter in all classes of wounds which were deep and sinuous.

In the “Veterinary Journal” for April, 1918, there appeared an interesting and well illustrated article by Captain Peatt on “The adaptation of Carrel's Tube Treatment to Septic Wounds.” In some of the veterinary hospitals this treatment was applied on a large

* Bismuth sub-nitrate, 1 part; iodoform, 2 parts; liquid paraffin, 1 part.

scale very successfully, but in the field itself it was naturally hardly applicable. The apparatus as described by Captain Peatt consisted of :—

- (1) A reservoir in the form of a small tank with a pipe leading from the bottom, one to hold six pints being the most convenient size ; the reservoir being fixed above the animal to the roof or wall at a slightly higher altitude than the wound.
- (2) Conducting tubes and installation tubes of rubber. The conducting tube, with a lumen of about $\frac{1}{4}$ inch and 4 ft. to 6 ft. long, leads from the pipe on the bottom of the reservoir to the wound, and has a stop-cock on it to regulate the flow of fluid. The installation tubes are from 9 inches to 2 ft. long, with a lumen of from 1-16th to $\frac{1}{4}$ inch, and may, or may not, be perforated laterally with small openings. These are inserted as far as possible, by means of a pair of long handled bullet forceps, into the depths of the wound.

Either eusol or Dakin's solution is suitable.

The principles of treatment were to clear away, as far as possible, all dead tissues and foreign bodies ; to insert one of the smaller tubes into the bottom of the wound ; to adjust the cistern and allow the solution continuously to irrigate the depths of the wound.

A comparison between the results of eusol and Dakin's solution showed that there was no appreciable difference between the value of the two liquids, and the cheapness of the former antiseptic, together with the ease with which it is prepared, made it one of value where large numbers of wounds had to be treated.

Surgery of the Head and Face.

Surgery of the head and face included, in addition to the usual operations met with in peace time, a certain number of reparative processes which were employed in order to render the animals useful, even if only for work at the base. Such operations as trephining for nasal gleet were frequently found to be necessary, and attention to the teeth was always one of the first essentials, especially in cases of debility. The rasping down of rough edges and the levelling of projecting molars, together with an occasional extraction, formed part of the daily routine in a well-managed hospital. The tooth instruments provided as part of the equipment of a veterinary hospital were all that could be desired, and if anything was wanting it was a comparatively easy matter to get it made by that hospital handyman, the farrier-serjeant. Shell wounds and injuries gave scope for ingenuity in regard to reparative processes ; in particular, in the removal of the eyeball, the eyelids being made to unite together in such a way as to avoid the unpleasant appearance of the empty orbit. Cherry's operation, too, was on numerous occasions performed, so that large wounds which had otherwise refused to heal were made to heal successfully.*

* "Veterinary Journal," 1918, page 400.

Wounds of the nostril and lips were a frequent feature, but their treatment did not call for any special advance in surgery.

Poll evil.

Considerable advances were made in the bolder surgery of this condition owing to the extended opportunities that arose for testing the radical operation first brought into prominence before the profession by the well-known surgeon, Professor Williams, of Cornell, U.S.A.

It had been the custom to teach that if the ligamentum nuchae was cut completely through in the region of the poll the head would drop and that the patient could not then hold it up. This erroneous idea had been handed down by teachers of surgery through generations of students until at last Professor Williams disproved the theory. His radical operation consists in boldly excising and removing the whole of the necrosed portion of the ligament and all other diseased tissue at the same time, leaving very often, it is true, a huge wound to heal by granulation afterwards. It is, however, astonishing how that wound does eventually fill up, and experience in the veterinary hospitals proved that the radical operation was both economical and practical; in fact, the best and quickest way to return the patient to usefulness in the majority of cases.

A very ingenious bridle, which enabled the patient to go to work before the wound had actually healed, and was thus instrumental in saving considerable time, is described in the "Veterinary Journal" for 1917, page 285, by Major J. R. Hodgkins, F.R.C.V.S., who states that it was first devised and was in constant use in the hospital under his command (No. 3, B.E.F., France).

It consisted of a light iron framework, which passes across the brow and rests on the supra-orbital processes encircling each ear. The ironwork was covered with leather and stitched on to felt which corresponded in shape with, but was larger than, the framework. The cheek pieces and throat lash were attached to the framework at a point below the base of the ears, and the portions of the framework encircling the ears were bent forward in such a manner as to obviate any pressure in the region of the poll.

Surgery of the Throat, Neck and Thorax.

The surgery of the neck itself included many vagaries in wounds usually caused by bits of shell or shrapnel bullets. The incident related by Lieut. Wylie on page 550 is quite typical of some of the curious tracks made by a bullet, and most interesting post-mortem specimens were found, in some of which the bullet had become embedded into the cervical vertebrae.

Abscess of the parotid gave practice for the junior officers, and the venticle stripping operation for roaring was undertaken by the more experienced surgeons. Roarers were numerous, and it was no uncommon thing to have thirty or forty at a time in a single hospital. The operation as a rule proved successful, and fully 80 per cent. of

the cases operated upon returned to active service. Oesophagotomy and tracheotomy were not often required, but when necessity demanded they took their place amongst the useful operations.

Serous abscesses on the sides of the neck and shoulders, usually the result of a nip with the teeth of an adjacent horse, were of common occurrence and often gave a very great deal of trouble, as the skin became irremediably torn from the muscular tissue underneath it, and although not usually becoming necrosed, refused to re-adhere. As it was usually in a place where the bridle rein touched it and was generally more or less tender, some action was necessary to remove this soreness. From being a comparatively simple matter in time of peace, under the conditions of war such sores gave a great deal of trouble, and after being lanced in the usual way some of them continued to suppurate and discharge and to form a prominent sinus. Even if they healed, the puckered condition of the skin, if near where the harness or bridle rein could chafe, was not only unsightly but the animal was rendered useless for continuous work. Quite a large number of these cases were found at times in the veterinary hospitals, and it was to the ingenuity of the late Captain A. R. Routledge, F.R.C.V.S., that the following method of operations, which dealt with the lesion very efficaciously, was devised. The description which he gave in the "Veterinary Journal" for 1917, page 286, is quoted here in extenso. He says :—

"The method of operation is excision, which can be carried out standing, with a local anaesthetic. The tissues to be excised should be included in a long elliptical incision, the long axis being at right angles to the long axis of the neck. The skin in the neck region is very loose, and if the incision is long and acute-angled the wound will draw in to a straight line.

"The resulting operation wound may appear alarming—as much skin as 18 by 9 inches has been excised repeatedly in this hospital (No. 3, B.E.F., France). The operator need have no fear, as the wound invariably makes a good recovery without complication. Where a large portion of skin has been removed the average time for recovery is about two months."

The surgery of the thorax was practically confined to paracentesis thoracis and the curetting or removal of portions of injured ribs. On one or two occasions attempts were made to remove complete portions of the latter, but the success was indifferent. The conditions under which an equine patient had to be placed after the thorax had been opened are not comparable with those of man, and it seems impossible in the present state of our knowledge to guard against the complications which follow. It was, however, astonishing in some instances to see how a horse covered with bullet wounds, some of which must have passed right through the thorax, would yet survive.

Sinuuous Wounds of the Withers.

As in the surgical treatment of poll evil already mentioned, the radical operation of Professor Williams was freely carried out,

the results being excellent in a high proportion of cases. Although not necessary in every case, it is undoubtedly an operation of great value.

The after treatment of the wound, too, varied much in accordance with the case, and here the use of the Carrel-Dakin method was much favoured in some hospitals, whilst in others B.I.P.P. paste took precedence.

Surgery of the Abdomen.

As might be expected when large numbers of horses had to be collected hurriedly together, the civilian vendors lost no opportunity of getting rid of their cryptorchid horses and troublesome mares. Consequently, there were sufficient of these to be found in the veterinary hospitals to warrant the provision by the authorities of the special instruments necessary for the operation for the relief of animals troubled with excessive sexual exuberance and its resultant annoyance and danger to man and other animals.

Their presence gave the ambitious young surgeon sufficient opportunity to enable him (after instruction by a surgeon specialist) to get over the initial trials which beset all pioneer specialists, without the fear of losing a client or having to pay for a patient; and quite a large number of cryptorchids were successfully operated upon, and troublesome mares were cured by ovariectomy, their vicious propensities being thus removed with the satisfactory result of their return to military duty.

There is no need to describe in detail either operation, as they were each carried out in accordance with the principles enunciated in the text books devoted to these subjects, the cryptorchids' testes being sought for under chloroform and with due antiseptic precautions, and removed via the inguinal canal, whilst the ovaries of the troublesome mares were taken away per vaginam. Although these operations were performed under war conditions, the results compared in every way favourably with civilian results in time of peace, and peritonitis or death were of rare occurrence, a tribute to the advances made in veterinary surgery and a proof of the benefit of the adaptation of the teachings of Lister to the animal world as well as to man.

The scope of abdominal surgery was not, however, confined only to the two above-mentioned operations. Wounds and injuries, both large and small as regards the visible exterior, injuries to ribs, true fistulae, punctured and sinuous wounds passing into the interior, bullet tracks and wounds inflicted by bits of shell, the latter often very jagged and sometimes very small, must also be included.

In Italy, too, especially in the north where there was extensive mountain fighting and where mules were the chief animals of transport, the fragments of splintered rock—caused by shell fire—inflicted many nasty wounds and penetrated the flesh as readily as the bits of shell themselves. These punctured wounds had to be explored and the foreign bodies, if found, removed.

Sand colic was of common occurrence in some localities and often ended fatally, but attempts at the surgical removal of the sand

from the bowel, following an exploratory laparotomy, were unsuccessful, owing to the weight and position of the sand in the bowel. This form of colic was especially prevalent in the early days of the war in No. 10 Veterinary Hospital (at Neufchatel) which was located on sandy soil.

Attempts to remove, surgically, intestinal calculi were also unsuccessful.

Herniae were often met with and reduced by the ordinary surgical methods.

Surgery of the Urinary Tract.

Cases of vesical and urethral calculi were diagnosed, removed and dealt with as in times of peace ; but a distinct advance was made in the treatment of cases of paraphimosis. These cases were frequently met with, and at one period of the war, especially in the spring of 1917, quite large numbers of these cases arrived in the reception hospital from the front line.

The horses had passed through an exceptionally terrible time of hardship and exposure, being worked to the utmost on account of a big advance and not being allowed extra food on account of the impossibility of transporting it to them. The weather too was exceptionally severe, and the mud conditions were appalling. Many arrived at the reception hospital in an emaciated condition, numbers died in the trucks, and others fell down paralysed in the hind quarters and were shot at the station. Quite a big proportion had paraphimosis and, indeed, paralysis of the muscles of the penis. Some were too far gone to obtain relief, but with quite a number, in which amputation previous to the war would have been the only remedy to restore the patient to usefulness, the operation of Professor Vennesholm (of the Stockholm Veterinary School) was practised with success.

Its simplicity and value in doing away with the risk of stricture, from its non-interference with the urethra, together with the success which attended its performance in a large proportion of the cases in which it was performed, gave it as a practical operation a place of great value, always to be tried before amputation was resorted to, the latter becoming only a last expedient.

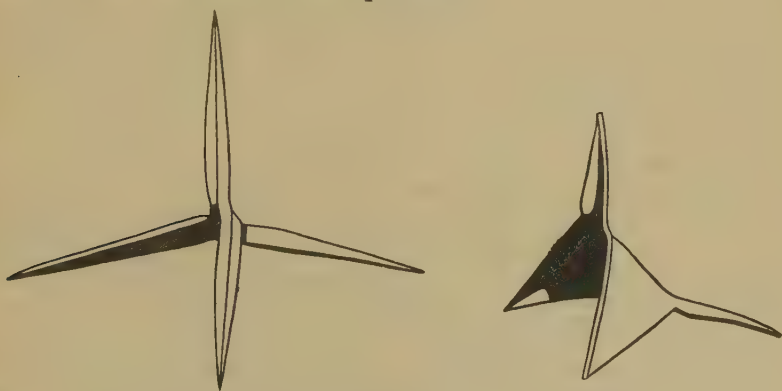
Surgery of the Limbs and Feet.

The surgery of the limbs differed little from that required in time of peace and included the usual contusions, wounds, periostitis of bone, splints, spavins, ring bones, side bones, and extososes and tumours of various kinds. The blister and the actual cautery were administered wherever it was thought that their use would be beneficial, but neurectomy, in the early stages of the war, was forbidden. As time passed on, however, this law was somewhat relaxed, especially in regard to the operation of median neurectomy in the draught and slower working horses for use at the base.

The ravages of the bacillus of necrosis played havoc with the lower part of the limb especially in certain districts and at certain

seasons of the year. Many horses had to be destroyed on this account, for huge sloughs invading the joint would often be found to account for acute lameness when the mud was removed. In those in which the joint was not invaded the tissues granulated very unhealthily and many weeks were required before efficient healing could be obtained.

The *picked-up-nail* was probably the greatest bugbear and cause of trouble in every area, and it was usually traceable to the ordinary French wire nail with which wooden boxes were fastened together. The wood was used for burning, and the nails were scattered on the road by the ashes from the cookers and from carelessness. So much so was this a source of trouble that in a number of areas boxes were put alongside the camps and roads and marked "For the reception of wire nails." The picked-up-nail trouble was as well known by the veterinarians of our French allies as by ourselves, being known as the "*clou de rue*." If withdrawn in time, the hole being filled with iodine, tar, or oily wound dressing, and the place protected from the mud, there was a reasonable prospect of the patient returning to work within a few days, but in very many instances the mischief was irreparable. Similar, but much more terrible, injuries were inflicted by the brutal caltrops or "*crows' feet*," thousands of which were thrown down by the Germans in the muddy tracks over which they knew our horses must follow in pursuit.



TWO PATTERNS OF CALTROPS OR "CROWS' FEET."

The weight of the horse treading on these would cause the point to penetrate through the hoof and sometimes right into the bone, fracturing it and often penetrating the navicular joint.

Quittors were numerous, and in one day in France alone there were 627 of these in one group of hospitals. They were treated at times by caustic or astringent injections, and at other times by surgical means. Of the former the favourite was a mixture of perchloride of mercury 10 grains and chloride of antimony 1 drachm, this being injected by means of a syringe when the animal was cast and after the wound had been curetted. After a second application, three days later, the results in a high proportion of cases were excellent.

Seborrhoea (Grease) and Canker gave, as might be expected where the shire and other hairy-legged breeds were continually standing in mud and wet, a considerable amount of trouble, and they sometimes proceeded to the stage at which surgical interference was necessary, although, owing to the exigencies of war conditions prevailing at the time, in very severe cases it was not always possible to return the animals to the fighting-line. A large proportion were, however, rendered temporarily useful for work at the base. In grease, where the "grapes" were present, the old-fashioned treatment of removal by means of the actual cautery was found to give the best results, the parts being afterwards treated with astringent and antiseptic dressings, and the patient sent to work as soon as possible.

Ulcerative Lymphangitis.—The surgical treatment by means of excision, or the free use of the actual cautery, was attempted, experimentally, for the treatment of ulcerative lymphangitis, free excision being made round the buds, or an attempt being made to obliterate them with a pointed firing iron. The results, however, were not such to justify their continuance.

Tumours of all kinds were met with, some small and multiple, some large and malignant or benign. There is very little that can be said in regard to them or their removal which does not equally apply to them in civil life. For the keen pathologist in charge of the veterinary laboratories attached to groups of hospitals during the later stages of the war they naturally formed a source of interest, and the results of their examination were of mutual interest and profit to the surgeon and the microscopist.

Anaesthetics.—No chapter on the surgery of the Great War would be complete without a well merited reference to the humane consideration shown to the animal patients as well as to the human sufferers. The well thought out provision of supplies of chloroform and cocaine to the veterinary hospitals cannot be too highly praised; and it was marvellous how all the hundreds of gallons of the former were obtained and transported to their destinations. Literally thousands of major operations were performed on animals, and practically every one under an anaesthetic. In the administration of chloroform, Cox's pattern of mask, as being the simplest, safest and most portable, was the one most generally used. Its cheapness and freedom from tedious complications recommended it as especially valuable for war time, and if more were wanted than the authorities had supplied, the hospital saddler could improvise one at short notice.

Disinfection.

The disinfection of the material used in the building of the stables and standings was very essential after the removal of infectious cases such as those of epizootic lymphangitis, especially in instances where the standings were to be used for the reception of surgical cases or those with open wounds. In veterinary hospitals a blow-lamp could always be obtained from the stores, and for ironwork

there was nothing better. For the woodwork, too, it was exceedingly effectual, especially if this had been previously coated over with tar. The only precaution necessary was that the man using it should have a little discretion. This method is fully described by Major J. R. Hodgkins, F.R.C.V.S., in the "Veterinary Journal" for 1917, page 286 in the following paragraph :—

"The usual methods for the removal of dirt in the way of scrubbing with hot water and antiseptic having been carried out, the standing is 'lamped' out. This dries the wood, iron, and other work. The hot tar is then applied. The application having been completed, the disinfecter takes a small tin scraper in his left hand, and a brazing lamp in the other. He boils away the surplus tar with the lamp, scraping the surface up and down, until the wood or other material is perfectly dry. The flame which arises from the tar is easily controlled and put out by the scraper. Tar applied in this way 'creosotes' the woodwork and preserves it. If a standing has already been tarred several times, it will be found that only at a few places will the tar need renewing. The application of the flame boils up the existing tar, which should be scraped up and down until a clean, dry surface remains."

CHAPTER XXV.

VETERINARY HOSPITALS.

The Financial Aspect of Veterinary Hospitals.

IRRESPECTIVE of cost, and apart from their essential function of relieving armies in the field of their burden of sick and wounded animals, there can be no doubt that veterinary hospitals are necessary in modern warfare for the following reasons:—

- (1) For the control of contagious diseases, in providing facilities for segregation. Without this means of control it would not have been possible, in the congested military areas of the British front line and lines of communication in France and Belgium, to arrest the spread of the many outbreaks of fatal or debilitating contagious diseases which were dealt with during the war.
- (2) For the accommodation of sick and injured animals under conditions which make it possible to apply the scientific methods of treatment which are necessary to effect their speedy restoration to fitness for further service.

In modern warfare, a remount service could not maintain the supply of animals required by an army in the field without taking into account those horses and mules discharged as fit for duty from veterinary hospitals. If this source of supply had not existed during the war, the available equine population of the world would hardly have sufficed to meet the requirements in animals of the British forces alone.

For the purposes of keeping up the animal establishment of an army, veterinary hospitals are, therefore, a vital necessity, be the cost what it may. Nevertheless, nothing received more anxious consideration from the Army Veterinary Service than the question of keeping down, as far as possible, the expense of the hospital maintenance of animals. Every means of supervision was taken to ensure that only those cases whose recovery within a reasonable, or rather an economic, period were retained for treatment. Every endeavour was made to discover and establish profitable channels of disposal of animals whose retention under treatment could not be justified on financial grounds. The strength in personnel on the establishments of veterinary hospitals was kept as low as was compatible with the care and treatment of the patients.

The capital cost of the buildings of the veterinary hospitals in France was met to a great extent by the generosity of the subscribers to the Royal Society for the Prevention of Cruelty to Animals. The work of constructing the veterinary hospitals in the theatres of war was, in great part, undertaken by the personnel of the Army Veterinary Corps.

Most of the work connected with the sale of horseflesh for human food, the disposal of animal by-products, and the supply of

horseflesh as a ration for prisoners of war, was done by the personnel of veterinary hospitals.

The financial results of these enterprises went far to discount the total cost of the veterinary services in France.

It was found that efforts directed to control the cost of veterinary hospitals must be unrelenting. The keen scientific worker in medicine and surgery and the organising economist do not meet on common ground when it becomes necessary, for financial reasons, to insist upon the destruction of interesting but protracted cases.

From such figures as are available, it would appear that, even if the credit due for sales by disposal of animals and animal by-products is neglected, the daily cost of maintenance of a horse in a veterinary hospital hardly exceeds the same cost with a field unit, and is not greater than its cost of maintenance by the remount service.

More than seventy veterinary hospitals, with accommodation in the aggregate for over 100,000 animal patients, were established during the war.

The following table shows the cost at which patients were maintained in a veterinary hospital in the Southern Command in the year 1915. This table may be taken as fairly representative for veterinary hospitals as a whole during that year. In subsequent years the expenses increased in accordance with the rise in cost of all commodities.

*Statement showing cost per head per day of horses in the
Station Veterinary Hospital at Bulford.*

	£	s.	d.
(a) Pay and allowance of officers	4	12	2
(b) Pay and allowance of civil veterinary surgeons	0	5	9½
(c) i. Pay of other ranks	10	7	0
Ration allowance	5	10	6
Separation allowance	1	12	2
ii. Pay of civilian subordinates	28	3	2¾
Rations of civilian subordinates	15	18	2
(d) Cost of forage and bedding	68	5	0
(e) Equipment, ordnance	6	1	4
Equipment, barrack	1	8	0
(f) Water	0	19	9
Light	0	5	5
(g) Medicines	1	8	2¾
(h) Other expenses :—			
Barrack charges	1	13	6
Clothing of soldiers issued	0	3	0
Total daily expenditure	146	13	3
Total cost per month (31 days)	4,546	10	9
Average cost per day	146	13	3
Average daily number of horses—780			
Average cost per horse per day	0	3	9
*Daily rent—depreciation of War Department buildings	5	2	7¾

* Reckoned at 10 per cent. of cost price per quarter in case of temporary buildings erected for the war, and 5 per cent. per annum in the case of permanent buildings.

The Working of a Veterinary Hospital.

For the purposes of description of the working of this type of unit during the war a veterinary hospital in France has been chosen, but it may be said that, with some local variations, the principles were the same for all veterinary hospitals of the Army Veterinary Service.

The final establishment of a veterinary hospital in France comprised 7 officers, 2 warrant officers and 631 other ranks, and was capable of dealing with 2,000 patients.

The hospital was commanded by an officer with the rank of lieutenant-colonel. The second in command was a major. There were four other technical officers (captains or subalterns), and a quartermaster who also acted as adjutant.

For purposes of administration and technical efficiency the personnel was split up into a headquarters and eight subdivisions.

Headquarters.—The commanding officer, with the help of the adjutant and quartermaster, administered the headquarters and exercised general supervision over the hospital, for whose discipline, training and interior economy he was responsible. He allotted duties to all the officers under him, and gave them advice and instruction on military as well as professional matters. He issued the daily routine and standing orders which authorized the general duties of the personnel. He dealt with any matters requiring disciplinary action after a preliminary examination had been made by the officer commanding the sub-division concerned.

The adjutant and quartermaster, in his dual capacity, relieved the commanding officer of much routine correspondence and supervised the execution of the orders which were issued. As quartermaster he was responsible for all equipment, clothing, forage, rations, etc., and for all the connected returns. He did what was necessary to ensure the maintenance and repair of barracks, stables and other buildings.

The subordinate personnel of headquarters, who for the purposes of messing and quarters were distributed among the subdivisions, were employed in the following duties:—orderly room, quartermaster's branch, drawing and preparing forage, police, pharmacy, regimental institute, operating theatre, laboratory, saddler's shop.

Subdivisions.—Decentralization was practised as far as conditions allowed, the main object being to make each subdivision a self-contained unit. With this policy in view, the stabling of all the more lately built hospitals was laid out in eight blocks, each accommodating 250 patients and complete in itself with forge, dressing shed, expense forage store, branch pharmacy, and office.

Each subdivision was commanded by a captain or lieutenant, who was responsible to the commanding officer for the discipline, training and employment of his men, as well as for the interior economy, pay, clothing, messing and quarters of his charge. All questions relating to these matters were referred to him for

investigation before they were dealt with by the commanding officer ; similarly, all complaints or requests from the men were first enquired into by the officer of the subdivision concerned.*

The personnel, as may be seen from Table " A, " comprised a due proportion of all ranks, including forge artificers, dressers, and a cook.

Subdivisional commanders were responsible for the horses allotted to their care, and for their treatment, feeding, and management. They were also responsible for all stores and equipment issued to them, and for the maintenance and sanitation of their standings and lines. Each subdivisional officer kept a separate case-book, and furnished a daily state on Army Form 3182 (see Table B) and, in mange hospitals, a special form ; he handed a ration state into the orderly room every evening.

Routine.—The usual routine of a veterinary hospital was :—

Reveille	5.30 a.m.
Parade	6. 0 a.m.
Stables	6. 5 a.m.
Water	6.45 a.m.
Feed	7.15 a.m.
Dismiss	7.30 a.m.
Breakfast	7.45 a.m.
Orderly room	8.30 a.m.
Sick parade	8.30 a.m.
Parade	8.45 a.m.
Stables	8.50 a.m.
Water	11. 0 a.m.
Feed	12.15 p.m.
Dismiss	12.30 p.m.
Dinner	12.45 p.m.
Stable guard and defaulter parade ..	1.15 p.m.
Parade	1.45 p.m.
Stables	1.50 p.m.
Stable guards' parade	2. 0 p.m.
Water	4. 0 p.m.
Feed	4.45 p.m.
Dismiss	5. 0 p.m.
Tea	5.15 p.m.
Guard mounting and defaulters' parade	5.45 p.m.
Stable guards' tea	6.15 p.m.
Feed	7. 0 p.m.
Roll call	9. 0 p.m.
Lights out	9.15 p.m.

General Working.

Admissions.—All animals admitted to hospital from a mobile veterinary section or unit were shown upon an accompanying evacuation roll (see Table " C "), giving a full description of each patient and stating its unit or origin and the cause of evacuation.

* For Tables see pages 574 to 581.

For chargers there was also a special form stating the owner's rank, name and regiment.

As described later, the patients were first admitted to a part of the hospital definitely allocated to that purpose where, on arrival, each animal was carefully examined and the details on the evacuation roll were verified and recorded in the hospital admission book. The patient was then allotted a serial number, which was stamped on a piece of tin bearing the date of admission ; this permanent means of identification was then fastened on to the near side of the head collar.

All particulars, including any variation of diagnosis or other new circumstance affecting the case, were recorded upon a treatment card. This card was the record of the patient during his treatment, and it accompanied him on transfer to another hospital, all clinical details being inscribed on it from time to time. When the patient was discharged, whether for issue to remounts, destruction, or sale, the card was completed and filed for reference.

Each animal on admittance, if in a suitable state of health, was forthwith tested with mallein, the result being recorded on the treatment card. Patients admitted on transfer from other hospitals had already been tested and arrived with this fact duly entered upon their treatment cards. A second test was made fourteen days after admission.

Branding.—All animals on admission were examined in this respect and re-branded with the broad arrow if necessary.

Posting.—After being tested with mallein and duly observed, the newly admitted animals were posted to the particular subdivisions appropriated to the treatment of their various maladies.

Internal transfers.—Patients allotted to a subdivision for treatment as a rule stayed there until discharged ; but if it became necessary to move them to another subdivision, vouchers in manuscript were passed between the officers concerned, and of course the treatment card accompanied the patient.

Period of treatment.—In veterinary hospitals for 2,000 cases, and indeed in all large veterinary hospitals, it was found that there was a tendency to lose sight of the length of time patients were under treatment, so that the period of residence in hospital of certain cases was unduly protracted. In order to prevent this, it was necessary to introduce a system of returns, whereby it was easy to detect instances of animals remaining in hospital longer than could be justified on economic grounds. In France a state was rendered by subdivision officers on the 7th, 15th, 23rd and 30th of each month (see specimen Table E) showing the number of cases in their charge and the months they were originally admitted for treatment as recorded on the hospital cards. As this was a cumulative return, the commanding officer could readily ascertain from it the progress being made in the discharge of the older cases ; those which had been under treatment for more than a certain period were paraded weekly for his inspection.

Animals proposed for destruction.—All cases proposed for immediate destruction were submitted forthwith for inspection by the commanding officer who, if he confirmed the proposal, decided whether the case should be disposed of by:—

(a) Destruction and burial, or

(b) Destruction for butchery purposes.

If (a), it was destroyed, and the carcass was handed over to the officer i/c burial ground, a receipt being obtained. If (b), the animal was "cast-branded" as usual, and also branded on the neck with the number of the hospital and a "B" in five inch lettering. It was then sent in an ambulance to the local abattoir to be slaughtered in the presence of a representative of the A.V.C.

Animals proposed for casting.—Parades were held twice weekly at which subdivision officers submitted for the commanding officer's inspection all the animals that they considered unfit for further service. Those cases whose disposal was approved of by the commanding officer were subsequently paraded for the inspection of the D.D.V.S. of the area, who decided whether they were to be retained or cast and sold to (a) farmers or (b) horse butchers. A manuscript list, giving full descriptive details and cause of casting of each lot approved for casting, was compiled and signed by the D.D.V.S., together with A.F. W3088 (Sale Return) in quadruplicate.

In both categories the animals were cast-branded in the usual manner. The number of the hospital was branded under the broad arrow, thus $\begin{smallmatrix} \Psi \\ 22 \end{smallmatrix}$. In addition, cases for the butcher were branded on the neck in five inch lettering with the number of the hospital and a "B", thus 22 B.

A certificate giving a full description of the animal, and stating that he was free from contagious disease and had been tested with mallein, was provided for each animal sent for sale to farmers and was handed over to the purchaser. Those destined for sale to butchers were also previously tested with mallein.

Water.—Animals were watered three times daily; and where water was laid on to each stable, patients were restricted to the use of their own stable trough.

Forage and Feeding.—The scale of forage laid down for horses in veterinary hospitals was the same as that sanctioned for effective animals, but was subject to reduction when the military situation required it. The scale in force in March, 1918, was:—

	Oats.	Hay.
	lb.	lb.
Horse, heavy draught	17	15
Other horses, fifteen hands and over, and draught mules	12	12
Horses under fifteen hands and pack mules	10	12

Equivalents : 1 lb. crushed maize = 1 lb. oats.

$1\frac{1}{2}$ lb. bran = 1 lb. oats.

Linseed and linseed cake could also be drawn in lieu of oats.

Locust beans and green forage and roots were issued from time to time in lieu of part of the hay ration on a scale which varied with the prices of these commodities at the time.

Preparation of Forage.—All veterinary hospitals were provided with a motor chaff-cutter and corn-crusher; as a general rule about 5 to 6 lb. of hay were chaffed and 4 to 5 lb. of oats were crushed for each animal in hospital.

In those hospitals where dipping-baths were installed, a branch pipe was run from the boiler to a 1,000 gallon tank, whence steam was obtained for crushing oats, bran, linseed and roots. By this means, 2,000 to 2,500 hot feeds daily could be cooked; they were sent out to the stables in five-gallon drums each holding five feeds. In hospitals where steam was not thus available it was necessary to depend upon the use of soyers stoves. The patients were fed four times daily: at 7.15 a.m., 12.15 p.m., 4.45 p.m., and 7 p.m. Hay was given, as a rule, at 10 a.m. and 4.45 p.m. The diet was naturally varied as far as practicable in accordance with the nature of the case and the condition of the animal.

Exercise.—Each hospital was equipped with a track for exercising horses at liberty, and a time-table was drawn up weekly allotting a definite time to each subdivision, which made its own arrangements for carrying out the exercise. In addition, animals were exercised on the roads during early morning stables. Road exercise was carried out ordinarily by means of the rope-system, whereby three men could manage twenty horses, but special horses or chargers were sent out in pairs, one ridden and one led. It was found possible by these means to exercise at least 1,000 horses a day. Subdivision officers stated on their daily returns the number of animals that had been exercised.

Grooming and Grooming Kits.—A complete set of grooming kit was provided for each horse in hospital and was kept in a special wire basket at the back of each stall. Every man was provided with a small bucket, made out of half an oil drum, which contained disinfectant solution for cleaning his grooming kit.

Clipping.—In some hospitals clipping was done under subdivision arrangements; in other hospitals all clipping was done in two central clipping sheds (one for "clean" and one for skin-disease cases) where the subdivision clippers worked under the supervision of a headquarters N.C.O. In either arrangement the standard day's work was fixed at eight horses for each clipping machine. A record of the date of clipping was made on each animal's card, and the non-commissioned officer in charge of the clipping-shed rendered a daily state showing the hospital number of each animal clipped.

Shoeing.—This was done by subdivision arrangement. Shoeing-books were kept by the N.C.O. in charge of each forge, showing the hospital number of each animal shod and whether new or old shoes were put on. An extract of this information was rendered daily to the farrier-quartermaster-serjeant, who compiled a consolidated statement.

Operating Theatre.—The operating theatre was in charge of a N.C.O. assisted by an anaesthetist and a number of trained dressers belonging to headquarters. Each subdivision was allotted certain times of the day for using the theatre. A record was kept of all operations performed and the result of each.

Dipping-bath.—In hospitals equipped with a dipping-bath, the installation was placed in charge of a N.C.O. of headquarters assisted by three men of headquarters and twelve men detailed by the subdivisions. The N.C.O. was responsible for the care of the boiler, the preparation of the lime and sulphur mixture, the filling of the bath, the correct temperature of the fluids, general supervision, and the record of the numbers of animals passing through. He was assisted in these duties by the three permanent men, while the subdivision men acted as leaders, ropemen and catchers.

Disinfection.—A portable Thresh disinfector was supplied to each hospital and was kept continuously at work when rugs were in use. It was placed at the disposal of each subdivision in its turn for a whole day. Mangers were scrubbed out daily, and the whole stable was disinfected once weekly; blow lamps and spray pumps were used for this purpose. Saddlery was disinfected weekly, and all grooming kits were thoroughly cleaned and disinfected by dipping in boiling water and then scrubbing with creosol solution.

Water troughs were emptied and scrubbed daily, and with disinfectant once weekly.

Discharges from Hospital.—In hospitals which adjoined remount depots it was usual to discharge cured cases every day or every second day, but where there was no remount depot close at hand patients were collected and sent away weekly, either by road or rail, according to distance. All were tested with mallein, and inspected and passed by the commanding officer before leaving the hospital. Any horse which, in his opinion, was serviceably sound but was not fit for rigorous work at the front could be sent out as a special case for duty on the lines of communication. Such animals were branded with a "V" on the near hind foot, and a descriptive roll stating the reasons for the exceptional classification was sent out with each animal. A descriptive roll was also sent with each officer's charger on discharge to a remount depot. The treatment cards of all discharged animals were filed for future reference.

Interior economy and accounts of Veterinary Hospitals.

Animal Account.—An animal account was rendered in duplicate with all supporting vouchers to the D.D.V.S. of the area for transmission to the financial adviser at the end of each month.

The special buff slip (shown in "Veterinary Manual for War"), made out in duplicate by the officer commanding the mobile veterinary section concerned, accompanied all animals evacuated from the front, and was used as a voucher to support their being brought on charge.

Receipts from, and issues to, other veterinary hospitals and remount depots were supported by vouchers which were also used for animals sent in by other lines of communication units.

Deaths and destructions were supported by a certificate from the commanding officer which contained a statement concerning the disposal of the carcass.

Animals disposed of by sale were struck off charge ; the voucher for this was provided by the authority for casting, signed by the D.D.V.S., and the sales list which was signed by the officer who witnessed the sale and the cashier who received the money. A similar voucher supported the writing-off of animals which were sold for meat to horse-butchers.

Officers i/c subdivisions rendered a daily state showing the numbers of animals on their charge ; the total number in hospital was verified by the commanding officer personally at least once a month.

Forage.—Forage was drawn daily and checked in and stored by the N.C.O. i/c of forage. The Os.C. subdivisions rendered a state showing, by classes, the number of animals in their charge, and the Q.M. allotted the proper amount of each sort of forage. This was all laid out in separate lots, was duly checked and taken over, and a receipt for it was given by the subdivisional orderly N.C.O. on the following morning. A daily record of the forage due to the hospital, and the actual amounts drawn, was kept in manuscript and balanced monthly.

Rations and Messing.—Rations were demanded daily. When drawn they were put into the ration store and issued to the master cook in accordance with his actual requirements for each meal. All tinned food was opened before being issued. Stock of the contents of the ration store was taken weekly and all amounts surplus to actual requirements were under-drawn on the next indent, a careful record being kept in a special book of the stock in hand and actual under-drawals. By careful management and prevention of waste the amounts thus saved were considerable. The savings up to the time when the field rations were reduced averaged £4 to £4 10s. for every 1,000 rations drawn, though all ranks were well fed.

Every endeavour was made to reduce waste, the refuse bins being carefully watched. Kitchen waste was disposed of to contractors (or to Army Waste Products, Ltd.). The money thus obtained was placed to the credit of the men's account and used solely to improve the cost of the messing.

All fat, bacon rind, skimmings, etc., were rendered down for conversion into dripping, and any quantity found to be surplus to the requirements of the unit were handed over to the "Messing and Economies Branch" at a fixed price. The amount thus realized varied in accordance with the quantity of fresh meat issued as rations, and was placed to the credit of the men's messing accounts. Men were arranged by subdivisions into messes of from fourteen to sixteen each, in charge of a N.C.O. Diet sheets were made out for subdivisions a day in advance, every endeavour being made to

vary the menu. No opportunity was lost of drawing equivalents in the form of flour, dried fruits, etc., and these articles, supplemented by ground biscuit meal, ensured a plentiful supply of puddings and cakes.

Equipment.—The scale of ordnance equipment allowed was that laid down in the mobilization store tables as amended from time to time. An equipment ledger in manuscript was kept showing receipts and issues of all stores except those that were expendable, the entries in the ledger being supported by the usual vouchers. Articles unfit for further use were disposed of under the orders of the chief ordnance officer, vouchers for them being passed. A scale of equipment for each subdivision was drawn up by the C.O., and a tally-board was issued to each showing the articles held on charge; unserviceable articles were replaced on fixed days on production of those worn out. A regular inspection and stock-taking was usually held once a month.

Clothing and Necessaries.—A clothing ledger in manuscript was kept containing entries of all articles received and issued. Issues free or on payment were supported by vouchers. Each subdivision officer paraded on a fixed day those of his men who required clothing, which was issued direct to the men by the Q.M.; the worn-out articles were always withdrawn and taken into store for return to ordnance. Deficiencies were charged against the man unless he could give a sufficient reason for the loss.

Pay and Accounts.—The imprest account was kept in accordance with regulations. The acquittance rolls, with the names arranged by subdivisions, and the entries in the pay-books (A.B. 64) were prepared in the orderly-room. This procedure gave the C.O. every opportunity of exercising supervision over the payments. The exact amount necessary to pay his subdivision was then handed to each officer, who paid his men and signed their acquittance rolls on behalf of the C.O. The men were paid weekly and, provided they were of good character, drew up to the amount of their credit.

Returns.—The undermentioned were the principal returns which had to be regularly submitted by the officer commanding a veterinary hospital :—

Description of Return.	To whom submitted.
Daily—	
Return of animals in hospital and changes during the day	D.D.V.S.
Weekly—	
Return of strength of personnel ..	D.D.V.S.
Field return	Commandant, area.
Field state	D.A.G., base.
Return of sick and injured animals (Friday)	D.D.V.S.
Crime and offence report	Officer i/c A.V.C., base records.

Returns.—Continued.

Description of Return.	To whom submitted.
Monthly :—	
Inoculation return	Senior medical officer.
Nominal roll of officers serving in unit	Commandant, area.
Classification of horses and mules in hospital	D.D.V.S.
Return of officers	D.A.G., base
Imprest account	Command Paymaster.
War diary	D.A.G., base.
Animal account	D.D.V.S.
O.R. recommendations for promotion	Officer i/c A.V.C. base records.
Return showing prices realized by cast and sold horses during month	D.D.V.S.

Veterinary Hospitals in France.

The foregoing description of the working of a veterinary hospital, though particularly true of the units with the British Expeditionary Force, is generally applicable to veterinary hospitals as a whole. That which now follows, however, has only to do with the veterinary hospitals in France because in no other theatre of war were there so many of these units as to allow of their being specially grouped.

The peculiar circumstances of trench warfare on a great scale, with a short line of communication and accumulations of veterinary hospitals at relatively few centres, made it possible and advantageous to organize the work of these hospitals in groups. Consequently, at each of the chief base ports where base remount depots were established, and at centres on the lines of communication nearer the front, groups were formed, each comprising :—

- (1) a reception hospital ;
- (2) a mange hospital ;
- (3) one or more general hospitals.

Reception Veterinary Hospitals.

As the title suggests, the object of these hospitals was to receive the animals directly evacuated from the front. Because the patients arrived in big batches by returning supply or special sick-horse trains, it was necessary that ample accommodation and facilities should be provided in a reception hospital for the purposes of inspection, sorting and despatch. Among the arriving patients there were usually some suffering from contagious disease, e.g. mange, or ulcerative lymphangitis ; these came down from the front in special trucks properly labelled, but needed to be kept segregated pending their despatch to special hospitals. Others, on account of their age or disabilities, were not worth treatment, and it was desirable that they should be dealt with on the spot so that the cost of conveyance to other hospitals might be saved.

To meet all these requirements the hospital was divided as

follows into sections, one or more subdivisions being allotted for the work of each :—

- (1) Admission.
- (2) Retention.
- (3) Transfer.
- (4) Disposal.

Admission Section.—Into this section were taken all fresh admissions in order that they might be properly examined in accordance with the routine already described. As the animals had all to be kept under observation for forty-eight hours during the mallein test this section had to be large enough to accommodate the animals that might require admission during at least two days, i.e. from 500 to 750 animals. Consequently, two or three subdivisions were required to do the work of the admission section.

The admission section was again divided into the following groups :—

- (1) Surgical.
- (2) Medical.
- (3) Remount “casters.”
- (4) Mange.
- (5) Other contagious diseases.
- (6) Destruction and butchery cases.

Each animal after being “malleined” was allotted to the appropriate group, where it remained under observation for forty-eight hours. By the end of that time its future disposal was decided. Broadly speaking, all severe and very slight cases (except mange) were marked for retention; the former because of unfitness to travel, the latter because treatment would be short and they could soon be re-issued to remounts. Consequently they were drafted to the “Retention” section.

All moderate cases were marked for the “Transfer” section; and all remount “casters” were sent at once to the nearest remount depot. Any animals considered by the C.O. not to be worth treatment were put into the “Disposal” section. In each case the treatment card, duly completed with a record of the mallein test, accompanied the patient.

Retention Section.—This section was divided into :—

- (1) Surgical.
- (2) Medical.
- (3) Convalescent.

Treatment being carried on in the same way as in a general hospital.

As mentioned above the cases were either very serious or slight. The former, when sufficiently recovered, were moved to the next section; the latter were conditioned for transfer to remounts.

Transfer Section.—This section was divided into :—

- (1) Surgical.
- (2) Medical.
- (3) Mange.

It contained all the animals ready for transfer to other hospitals.

All were sorted and properly arranged so that a given number of any type of case could be drafted as required.

Under the orders of the D.D.V.S. of the area, it was continually cleared by the transfer of batches of animals to other hospitals. Those for adjacent hospitals were despatched by road, while others destined for more remote units were sent away in train-loads. A train-load usually comprised 280 animals in 35 trucks ; a conducting party of one serjeant, one corporal, one dresser and one man for each truck accompanied it, with first-aid dressings and forage for the journey.

The treatment card for each case accompanied the consignment so that the officer taking over the patient could record any change of diagnosis, development of a fresh disease, and all treatment. By this means it was possible to know exactly how long each patient had been in hospital and to trace his original source should he subsequently develop contagious disease.

Disposal Section.—In this section were collected all those animals whose age or disability rendered them, in the opinion of the C.O., unfit for further military service. They were graded into three classes :—

(a) Urgent and painful cases. These were dealt with by sale to local butchers, provided that their maladies did not cause them to be unfit for human food.

(b) Less serious cases fit to travel by rail to contractors for butchery purposes.

(c) Cases proposed for sale by auction to farmers.

Classes (b) and (c) were disposed of accordingly after inspection and approval by the A.D.V.S. of the area.

General Hospitals.

The principle of grouping together cases of a similar type was also practised in a general hospital, each subdivision being required to deal with a separate class of case.

A fairly representative distribution was :—

A subdivision, reception ward.

B " " lameness.

C " " quittor and surgical foot cases.

D " " other surgical cases.

E " " pneumonia and catarrh.

F " " debility.

G " " isolation for treatment of contagious disease, except mange.

H " " discharge lines.

It will, however, be evident that no permanent allotment could be laid down, because the numbers of cases of each disease received depended upon whether it was an advanced or a base hospital, the time of year, the prevalence of certain diseases, and other factors.

If any animal was found to be affected with mange it was transferred to the mange hospital, and the necessary measures of

disinfection were taken in pursuance of an endeavour to keep the hospital free from contagious skin disease.

A Subdivision (Reception Lines).—As most of the animals received had already passed through a reception hospital, and consequently had already been malleined, examined, diagnosed and classified, it was usually possible to send them direct to the ward indicated by their card. The reception ward of a general hospital therefore had only to be of a size sufficient to deal with sick animals from local sources; the procedure was identical with that followed in dealing with admissions in a reception hospital, as already described.

B, C, D, E, F, G Subdivisions.—Each subdivision working as an independent unit allotted one stable for cases as they became convalescent. Extra exercise was given to these animals in order to get them fit. On certain days, at least twice weekly, each subdivision paraded its cured cases for transfer to the discharge lines. A careful record, for purposes of comparison, was kept of the results obtained by each of these subdivisions.

H Subdivision.—This was employed on discharge work.

Mange Hospitals.

In hospitals which were concerned only with the treatment of mange, the group system was also observed; each subdivision, as far as practicable, dealt with a separate variety or degree of parasitic skin disease. The groups were approximately:—

- A. Admissions.
- B. Advanced sarcoptic mange.
- C. Sarcoptic mange.
- D. Sarcoptic mange (debility).
- E. Psoroptic mange and forage acari.
- F. Surgical (mange).
- G. Convalescent.
- H. Discharge.

A Subdivision (Admissions).—The duties of this subdivision were similar to those of the admission section of an ordinary hospital, with the addition of microscopic diagnosis of the cases and consequent transfer of the patient to the appropriate subdivision. If the patient was also affected with a disease other than mange, the circumstance was also recorded on his card.

B, C, D, E, F Subdivisions.—In the hospitals in France a definite routine was adopted. The patients were first clipped and then dipped from two to four times a week in the specially constructed dipping-bath. In the intervals of dipping the animals were groomed and exercised as much as possible. They were washed with warm water and soap once weekly. The treatment was continued until all signs of itchiness disappeared, and recovery became evident by the reappearance of a freely growing coat of hair.

Each subdivision worked on these lines, recording on the patient's card the extent of treatment carried out. Treatment of the case began in the bottom stable of the subdivision; as it

progressed it was moved up, until it ultimately reached the top or convalescent stable, where it was kept under observation from ten to fourteen days.

Twice weekly each subdivision officer submitted for the C.O.'s inspection all the cases which he considered cured. Those passed as clean were transferred to :—

G Subdivision (Convalescents).—The patients were retained here under observation for at least fourteen days, receiving increased exercise and grooming. If any showed itchiness or symptoms of recurrence of the disease they were sent back to the subdivision to which they originally belonged. Those that appeared to be permanently cured were transferred to :—

H Subdivision (Discharge Lines).—In these lines they were tested with mallein and passed out to remounts by the C.O.

TABLE A.

No.....Veterinary Hospital.

Details.	Subdivisions.								
	H. Qrs.	A	B	C	D	E	F	G	H
C.O.	1	—	—	—	—	—	—	—	—
Officers	—	1	1	1	1	1	1	1	1
Adjutant and Quartermaster	1	—	—	—	—	—	—	—	—
Warrant officers	1	—	—	—	—	—	—	—	—
Staff-serjeants	1	1	1	1	1	1	1	1	1
Serjeants	2	2	2	2	2	2	2	2	2
Lance-serjeants	2	1	1	1	1	1	1	1	1
Corporals	3	4	4	4	4	4	4	4	4
Lance-corporals	4	3	3	3	3	3	3	3	3
Privates (dressers)	9	8	8	8	8	8	8	8	8
Privates (grooms, etc.)	23	52	52	52	52	52	52	52	52
Farrier quartermaster-serjeant	1	—	—	—	—	—	—	—	—
Farrier-serjeants	—	1	—	1	—	1	—	1	—
Shoeing-smith corporals	1	—	1	—	1	—	1	—	1
Shoeing-smiths	1	3	3	3	3	3	3	3	3
Saddler corporal	1	—	—	—	—	—	—	—	—
Saddlers	4	—	—	—	—	—	—	—	—

TABLE B.
DAILY STATE.No.....*Veterinary Hospital.*No.....*Ward.*

Date.....

	In last Return.	Admitted since.	Total.	Cured.	Transferred Sick.	Transferred to C.H. Depot.	Died.	Destroyed.	Cast and Sold.	Remaining under Treatment.	Number of Cases of
Class 1											Debility.
2											Catarrh. Pneumonia.
3											
4											
5											Parturition.
6											Colic.
7											
8											
9											Sarcoptic Mange. Psoroptic Mange. Ringworm. Lice.
10											Laminitis. Quittor. Bone Disease.
11											Anthrax. Glanders. Influenza. Strangles.
12											
13											Exhaustion. Wounds. Fistula, Withers. Sore Backs. Fractures. Sprains.
Total											

TABLE B.—*continued.*

PERSONNEL OF WARD.

A.V.C. Staff.	Effective.	Non-effective.*	Attached.	Effective.	Non-effective.*	Remarks.
Staff-serjeants ..						
Serjeants ..						
Lance-serjeants ..						
Corporals ..						
Lance-corporals ..						
Privates ..						
Farrier staff-serjeants and serjeants ..						
Corporal shoeing-smiths						
Shoeing-smiths ..						
Total ..						

* If non-effective, state cause.

Suggestions :

Serious cases :

Proposed for destruction :

Cause of deaths :

TABLE C.
ARMY VETERINARY SERVICE.
Roll of Horses Evacuated for Veterinary Reasons.

No.	Class.	Colour.	Sex.	Height.	Age.	Distinguishing Body Marks including Brands.	Foot Marks.	Reasons for Evacuation.	Unit.

Date.....

.....Mobile Veterinary Section.

.....O.C.

.....Division.

TABLE D.

No.....Veterinary Hospital.

Unit.	Hospital No.	Description.

Admitted..... Discharged.....

Disease

Diet..... Exercise.....

[illegible]

TABLE E.

Statement showing the Number of Animals admitted in various months which are still under Treatment.

B Subdivision.

Admitted prior to and in June and remaining on				Admitted in July and remaining on				Admitted in Aug. and remaining on				Admitted in Sept. and remaining on				Admitted in Oct. and remaining on				Total.
7 Oct. 1917	15 Oct. 1917	23 Oct. 1917	30 Oct. 1917	7 Oct. 1917	15 Oct. 1917	23 Oct. 1917	30 Oct. 1917	7 Oct. 1917	15 Oct. 1917	23 Oct. 1917	30 Oct. 1917	7 Oct. 1917	15 Oct. 1917	23 Oct. 1917	30 Oct. 1917	7 Oct. 1917	15 Oct. 1917	23 Oct. 1917	30 Oct. 1917	
4	1	—	—	14	5	4	—	63	30	9	—	95	92	87	—	74	122	150	—	On 7th Oct., 1917 .. 250 On 15th Oct., 1917 .. 250 On 23rd Oct., 1917 .. 250

The above shows the state of this Subdivision on 7th October.
15th October.
23rd October.

TABLE F.

No.....*Veterinary Hospital.*

Subdivision ,

DAILY STATES.

CLIPPING.

Stable No.	Case Nos. of Horses Clipped.	Nos. due for Clipping to-morrow.

DRESSING.

Stable No.	Case Nos. of Horses Dressed.	Nos. due for Dressing to-morrow.

WASHING.

Stable No.	Case Nos. of Horses Washed.	Nos. due for Washing to-morrow.

CURED.

Transferred to " A " during the week.....

Transferred to " A " to-day

Total ..

Number exercised.....

TABLE G.

No.....*Veterinary Hospital.*

DAILY STATE OF ANIMALS.

				Horses.	Mules.	Horses.	Mules.
Remaining last return	..						
Admitted—							
Received from					
"	"	"	"				
"	"	"	"				
"	"	"	"				
Issued—							
Discharged to					
"	"	"	"				
"	"	"	"				

TABLE H.

FORAGE REQUIRED.

Class.	No.	Oats.	Hay.	Bran.	Remarks.
Heavy Draught	..				
Ordinary				
Cobs				
Mules				

Strength of N.C.Os. and Men :

Effective

Non-effective

Attached.....

Total

.....Officer i/c

.....Subdivision.

.....191

The Construction of Veterinary Hospitals.

Some accurate descriptive details of the veterinary hospitals that were constructed in France may be of value. At the same time it is to be noted that no one veterinary hospital contained in itself all the advantages that existed severally in these institutions. Consequently the notes that follow are intended to combine, as far as possible, the good points of all in one description, which ought, therefore, to conform nearly to an ideal.

Veterinary hospitals are lines of communication units, and their location is regulated by military expediency, and depends on facilities for rail, supply and transport services; consequently the choice of the actual site of a hospital is, as a rule, limited. The following factors should, however, be borne in mind:—Proximity of good roads, water supply and railway, also ground which will permit of efficient drainage.

- (1) *Good roads* are of prime importance, and the fullest advantage should be taken of the permanent roads of the country. Certain roads have to be made in the hospital itself, and as the making of them and their upkeep usually devolve on the A.V.C. personnel to the detriment of their more legitimate duties, any factor which lessens their number, such as the utilisation of the roads of the country, is of incalculable importance.
- (2) *Water Supply*. In all probability there will be an existing piped water supply which can be utilised. Otherwise provision will have to be made from wells and streams by means of pumps and gravity tanks.
- (3) *Proximity to Railway*. The allotted transport determines this factor; there is insufficient margin of safety to permit of a hospital being situated any great distance by rail from the chief source of supplies.
- (4) *Ground*. There will probably be no choice as far as soil is concerned; but if gravel or sand is obtainable, so much the better. At any rate, a site which will permit of efficient drainage should be chosen if possible.

Materials for Construction.

Corrugated iron, wood, or tentage. In either case full advantage should be taken of any existing buildings on or near the site chosen to supplement accommodation.

Corrugated iron is undoubtedly the best for temperate climates; it is more durable, easily erected and kept in repair. But where iron is used it must be borne in mind that all buildings used for accommodation of personnel, stores, etc., should be lined and floored with wood.

Horse tents, which accommodate fifty horses in double rows facing each other, are guaranteed to last two years provided they are properly erected, secured and cared for.

The animals are secured by means of breast lines and a common manger is built between them. They can also be fed from nosebags ; this should be avoided, if possible, as it is difficult to ensure proper disinfection.

Lay-out.—In addition to the factors previously mentioned, the actual lay-out of a hospital will largely depend on the ground area available for the purpose.

The accompanying plan is for a hospital in a European country for accommodation of 1,000 sick animals, plus hospital transport and riding animals and the necessary A.V.C. personnel.

The front of the hospital is based on a main road, and here are located the offices, stores and accommodation for personnel. Immediately behind these buildings is a large open space in which are situated the parade ground, admission lines, and various hospital buildings. Behind this open space are the stables, and in rear of these the exercising ring.

By this arrangement the heavy wheeled transport will be kept outside the hospital, thus obviating the necessity for making roads for vehicular traffic inside.

Transport of materials, supply of forage to stables, removal of dung, etc., are effected within the hospital by means of Decauville railway.

Disposition of buildings (vide lettering on plan) :—

A. On left of the entrance gate are situated :—

- (i) The guard-room and cells.
- (ii) The C.O.'s office and orderly room.
- (iii) The quartermaster's department. This latter includes Q.M.S.'s office and equipment stores, carpenter's, tailor's, saddler's and barber's shops, forage barn, and dump if necessary, transport and riding stables and harness room, wagon park and motor garage, coal, coke and wood yard, petrol and oil stores.
- (iv) Dung loading platform.

B. On the right of the entrance gates are :—

- (i) The quarters of the personnel, which include dining rooms, cookhouse, meat and ration store, bath-houses (sitz, steam and shower), ablution room and drying rooms, serjeants' and corporals' messes and kitchens, canteen and recreation room, and the huts or tents of the rank and file.
- (ii) Urinals, latrines and incinerator.

C. On the left of the hospital, behind A, are the admission lines for all newly arrived patients.

D. On the right of the hospital, behind B, is situated the parade ground.

E. At the back of the open space C—D, and opposite the main entrance, are :—

Main forge, operating room, pharmacy, store, and clipping shed.

- F. Behind the preceding buildings are the stables in four main blocks or subdivisions, numbered 1, 2, 3 and 4. No. 4 is separated from the rest to enable it to be used for isolation purposes.
- G. Between subdivisions 3 and 4 there are located a mange hospital, the horse-dip, with subsidiary buildings for boiler and mixing tanks, tanks for cooking horses' food, animal steam bath, and Thresh disinfecter.
- H. Behind the stables are the exercising ring and crush.
- I. Arrangements should be made either for a burial ground or incinerator for the disposal of carcasses of animals dead from contagious disease and those unfit for human consumption where there is no carcass economiser plant or local knackery to deal with them.
- J. The officers' quarters will consist of huts, or, if available, a house in the vicinity of the hospital.

Details of Transport, Supplies, etc.

(1) *Roads.*

As previously stated, all heavy-wheeled transport is kept, as far as possible, outside the hospital itself, transport duties within being carried out by means of Decauville railway. Certain roads are, however, necessary within the hospital, and as they are used almost exclusively by animals they can be constructed in a light manner, the degree depending on the nature of the soil. The materials used for this purpose depend largely on the resources of the country, and vary from fascines covered with cinders to hard stone.

The chief of these light roads is that leading from the main entrance of the hospital to the stables via the block of buildings marked *E* on the plan, and is marked *K*. Others are those around and between the stables and that leading to the exercising ring marked *L* and *C*. Their width should be ten feet at least, preferably twelve feet.

In addition to the light roads, paths are made in the vicinity of the offices, stores, and quarters of the personnel. Rolled ashes are very suitable for such paths.

Too much stress cannot be laid on the importance of roads around and between the stables. In their absence, the ground soon becomes a morass, and increases the work of the subdivisions enormously.

(2) *Water Supply.*

(a) A well organized and plentiful supply of water is of paramount importance and, whatever its source, it should be laid on to the great majority of buildings in the hospital.

(b) *Water-troughs.* There should be one to each subdivision, (see plan 1a 1g). In addition, one is required for the hospital transport and riding animals' stable, and others for the admission lines (C1 C5), paddocks, etc. This arrangement at least enables an outbreak of contagious disease to be limited to one stable.

Those for the stables should be twelve yards long, and sufficiently wide to permit of watering on both sides simultaneously. Thus, twenty-five animals can be watered at a time, each groom taking two horses. In this way each stable can be watered by two visits to the trough, and, as all stables turn out to water simultaneously, the entire hospital can be efficiently watered within thirty minutes, thereby saving an enormous amount of time.

The best troughs are those made of concrete, reinforced by forage wire. They are made in sections of six feet, and can be joined together to make a trough of any length, and are supported by brick or concrete pillars placed at the junction of sections. They are inexpensive to make, easily kept clean and disinfected, and are very durable. Troughs are also made of canvas stretched on a wooden framework, army pattern, on the ground, and iron, corrugated and plain.

(3) *Forage.*

In some hospitals the main forage dump was located in the adjacent railway station yards; in others, in the hospital itself (see A1 on plan). In the latter, which is far preferable, it should be on the side of an outside country, main, or side road, in order to conserve the light hospital roads, and should be connected with the main forage barn (A2) by Decauville railway.

The forage is crushed or chaffed in the main barn by means of machines driven by oil, gas, electric or petrol engine. Here it is either mixed ready for consumption and issued in sacks containing a fixed number of feeds direct to the stables, or sent out in bulk to the expense forage stores in the subdivisions for preparation and distribution to animals, by means of Decauville railway. Boiled feeds are prepared in the special tanks adjoining the horse dip in G on plan.

(4) *Manure.*

Three dung-pits at least are required for each subdivision, and are situated on the side of the stables opposite the water-troughs (see 1f 1b). They are emptied by means of Decauville railway, and the manure is taken to a loading platform (A3) and there emptied into waiting carts for removal to dumps distant from the hospital.

The dung-pit walls should be made of iron, with a concrete floor. All dung should be removed as soon as dropped, the pits frequently emptied, and swilled out at night with disinfectant solution.

The dung dumps should be covered with earth to the depth of a foot, and the unloading face covered with a tarpaulin or sacks soaked in strong disinfectant every night; this procedure minimises the fly nuisance.

(5) *Decauville Railway* (see D.R. on plan).

Practically the entire transport duties within the hospital are carried out by railway; this obviates the necessity for roads suitable for wheeled traffic. It saves labour and time, and the trucks are propelled by animal or man power. It is easily laid, and is

repairable by farrier personnel. It proved the greatest boon in hospitals during the war. Its distribution is indicated on the attached plan in dotted red ink line. A turn-table is necessary at the main junction (see D.R.1.)

(6) *Drainage.*

The arrangement of drains largely depends on the nature of the hospital site. Surface drainage, by means of shallow channels and open drains, should be adopted as far as possible.

Details of buildings, etc.

(1) *Stables.*

The stabling is divided into four blocks or subdivisions, each capable of accommodating 250 sick animals, the distribution of which will depend on the class of hospital, i.e. reception, general, mange, etc.

Each block or subdivision constitutes, as far as possible, a self-contained unit and, with this point in view, separate feeding, watering, dressing, shoeing and clipping arrangements are made, and the necessary buildings for these operations are provided in addition to the subdivisional stabling.

On the other hand, centralization of shoeing and clipping into main buildings for those subdivisions containing non-contagious disease cases, and subsidiary buildings for that containing contagious disease, is stated by some authorities to be economical in many ways and equally, if not more, efficient.

Each subdivision contains five double stables lying parallel with each other, each of which accommodates fifty animals, twenty-five on each side facing each other. Each double stable should be 138 feet long, thus allowing width for each stall of 5 feet 6 inches.

Particulars of stalls (see plan W).

Depth : 10 feet, including manger from front wall to heel post.

Width : 5 feet 6 inches from heel post to heel post.

Height : (a) Front wall, dividing the two sides of stable to be 11 feet high and be closed from floor to floor.

(b) Eaves 8 feet from ground, with iron rain-water gutter. Back of stalls to be open.

Floor.—A great variety of material was used for this purpose and included concrete per se, concrete with movable wood covering, concrete slabs, stone sets and slabs, bricks edge on in cement, wood in the form of sleepers, planks and blocks laid in the form of parquet flooring, the interstices filled with earth to permit of drainage by percolation, cobble stones, etc.

Sound floors are most important as, apart from simplicity in being kept clean themselves, animals remained cleaner and so economised grooming labour, a point of no small importance.

The slope of the floor should be at least 1 inch in 5 feet, and carried out to surface drain at rear of stall, 12 feet from front

wall, and which, if the lie of ground permits, should slope from one end of the stable to the other.

Partitions.—Iron pipe bails, $2\frac{3}{4}$ inches in diameter, 8 feet 6 inches long, 2 feet 6 inches from ground, swung on chains fore and aft, with quick release device on aft chain.

Mangers.—Movable iron, 21 feet long, 19 inches wide, and 12 inches deep.

Hay Racks.—Iron, above mangers.

Fastenings.—Chains 2 feet 6 inches long on ring running on upright iron bar, 1 foot 6 inches long, fixed to front wall.

Roof.—14 feet deep, allowing an overhang of 4 feet from heel post to protect animals from rain, etc.

The foregoing remarks apply to iron stables, which are far preferable to wood, the latter being so frequently in need of repair.

It is advisable to have an open space of at least 48 feet between any two double stables, which can be utilized as follows (see plan Y) :—

(a) 12 feet road behind each row of stables.

(b) Outside standings for each row of stables, 12 feet deep and facing each other.

A common breast line is suspended between the two standings and surface drains placed in their rear to carry off storm-water, etc.

Feeding from nosebags or common trough.

Outside standings are of great use in fine weather, and also in emergency, such as when overcrowding takes place.

(2) The following buildings can with advantage be constructed to form an additional and separate block (see plan "W") in each subdivision, and thus make each a self-contained and separate unit. For obvious reasons, this block should be placed as near the middle of subdivisions as possible (see plan 2-A).

The practice of misappropriating stalls for these purposes is to be deprecated, as it lessens the stabling accommodation, the whole of which is required for its legitimate purpose.

(a) *Dressing Sheds* (2-A1). Floor should be of concrete and water laid on. Each should contain a Soyer's stove for heating water, and a bench for instruments, dressings, etc.

(b) *Expense Forage Store* (2-A2). These are necessary if forage is to be prepared for distribution in the subdivisions in preference to the main barn. Floor should be of concrete, water laid on.

(c) *Barrack Store and Office* (2-A3). These can be combined in one shed which, as the name expresses, is used for the custody of barrack stores and equipment, and to serve as an office for the officer and senior N.C.O. in charge of the subdivision. Floor to be of wood, with hooks and racks for equipment and desks for officer and N.C.O.

(d) *Colic Box* (2-A4). One is necessary for each subdivision. It should be roomy, sides padded, with deep bed of shavings,

straw, peat moss, sawdust, sand, etc. If completely closed in it will serve for examination and treatment of eye cases.

(e) *Footbaths* (2-A5). Two concrete-lined footbaths, adjacent to dressing sheds, are of great use. They should be roofed in and water laid on.

(f) *Forge* (2-A6). See item No. 4 "Forges."

(g) *Clipping Shed* (2-A7). See item No. 5 "Clipping Sheds."

(3) *Sling Stalls*.

There should be at least two in each subdivision. Two stalls in the stable facing the dressing shed should be constructed for this purpose (vide 2*b* on plan).

(4) *Forges*.

The arrangement of these depends on whether it is decided to have subdivisional forges with one fire, in which case the building would be included in the block previously mentioned, or a main forge (E4) with three fires for subdivisions 1, 2 and 3, and a smaller one for the isolation subdivision 4. In either case the fire (field forge) should be placed at the back of the building and a breast line fixed for securing animals for shoeing at least six feet from the back wall.

The front of the building being open, the best light will be thus afforded for shoeing.

Strong stocks, for restraining animals difficult to shoe, should be placed in one end of the building and a store for iron, nails, etc., at the other (E4*a*).

The floor should be of wood; sleepers are very suitable.

A wooden bench for tools should be placed against the back wall.

N.B.—A fifth field forge is of great use for iron repair work, and should be added to the mobilization store table of a veterinary hospital; it is constantly in use, and there is thus no interference with the legitimate shoeing work of the others.

(5) *Clipping Sheds*.

Their arrangement depends upon the same conditions as for forges (see E.S. and 4(7)).

Motor power is more likely to be obtainable to drive nine machines in one main building than three in subdivisional buildings.

The sheds should be divided into stalls by means of stout boards for the safety of the men, and each should be at least six feet wide. Rammed earth makes a very suitable floor. One end of the shed should be boarded off, and a bench erected for repair work and sharpening apparatus.

(6) *Animal Dip* (see G and Z1 and Z2).

Each hospital should be provided with a dip, or at least there should be one to each group of hospitals.

This installation comprises the dip itself, with a dripping shed at exit end, a boiler house for heating the bath with steam (it should register 110° F. when in use if calcium sulphide solution is employed), and two mixing tanks for making the solution. In addition, a shed containing tanks for cooking horse food, and one to act as a steam bath for animals, may be erected in the vicinity of the boiler house ; all derive their steam from the dip boiler.

A further addition, in the shape of a stone or concrete-lined footbath, placed at the entrance of the dip, was found to be a great labour-saving device for cleaning animals' feet and legs before they entered the dip.

The dip itself was shaped as shown at Z (1 and 2) on plan, and held roughly 3,200 gallons when ready for use. The emptying of the bath is always a problem and, in the absence of a country drainage scheme or stream, large soakage pits must be dug.

(7) *Post-mortem Slabs* (see I (i)).

A concrete slab for this purpose should be provided adjacent to the incinerator referred to in next paragraph.

(8) *Incinerator or Burial Ground* (see I).

One or other of these should be provided for the disposal of carcasses of animals that have died from contagious disease, and for those unfit for human consumption, in the absence of a local knacker-man or carcass economizer plant. Its site should be well away from the hospital and to leeward of the prevailing wind.

(9) *Paddocks*.

These should be provided, where possible, in the vicinity of the hospital. They are of great use, especially for war-worn horses, which lie about and rest and so recover tone much more quickly than if stabled immediately on admission. The animals are fed from nosebags, thus ensuring that each gets its full feed : the weaker do not go short, as happens when a common trough is used. Water should be laid on to a trough in the paddocks if streams are not available. Certain areas in the hospital itself (see R.S.T.D.) can also be used for this purpose.

(10) *Exercising Track and Crush* (see H).

An oblong or circular track, at least 150 yards long by 8 yards broad, fenced in on both sides, should be provided in rear of the hospital stables. Its position, size, and shape will, however, depend on the ground available.

Unless the soil is sand, a bottom must be made so that the track may be used in wet weather ; the expense incurred thereby is another factor regulating its size. Rammed clinker and broken brick, covered with a deep layer of ashes, is as cheap and effective a bottom as any.

The crush can be placed alongside the track at the entrance (see H 1).

(11) *Operating Rooms* (E(1) and 4(8)).

They should be roomy and closed in, with plenty of windows for light. The floor should be of concrete, with a sunken bed filled with sawdust and covered with a tarpaulin. Water should be laid on to a sink. A Soyer's stove should be provided for hot water, and a bench for instruments, dressings, etc. They should adjoin the pharmacies.

(12) *Pharmacies* (E(2) and 4(9)).

These should be lined with wood and rendered as damp-proof as possible. Benches, shelves and cupboards should be arranged round the walls, and in the case of the main pharmacy (E(2)) one end should be boarded off to serve as a laboratory. Water should be laid on to a sink. A store (E(3)) is also essential for the custody of empties; and a Soyer's stove should be provided for hot water. A stove is also necessary for the heating of the pharmacy itself.

(13) *C.O.'s Office, Orderly-room, Guard-room and Cells.*

These can be combined into one building (see Nos. A4-A7). An additional office for the regimental serjeant-major is recommended (A8). If constructed of iron, these rooms must be wooden lined and floored, with stoves for warming.

(14) *The Quartermaster's Stores, etc.*

The Q.M.'s office, store, carpenter's, saddler's, tailor's and barber's shops can be provided in one building (see Nos. A9-A14). These rooms will also be lined and floored with wood, and stoves supplied as above.

(15) *Main Forage Barn* (A2).

Outside one end a small building (A2 (a)) should be erected for the engine for driving the corn crusher and chaff cutter. These two machines are placed just inside the forage barn itself (see two red dots), the driving belt passing through the wall. It should be noted that the longer the driving belt the less is the driving power derived from the engine. In the case of wooden buildings, the engine shed must be lined with asbestos to minimise chance of fire. The floors of these buildings should be of concrete, and water should be laid on for mixing feeds and cooling engine respectively. In some hospitals a concrete-lined pit was let into the forage barn floor for this purpose.

(16) *Forage Dump, Coal, Coke and Wood Yard, and Wagon Park* (see Nos. A1, A15 and A16).

These should be in the vicinity of the foregoing and connected with it by Decauville railway. In the absence of a countryside road, a strong road leading from the country main road must be constructed. These dumps, etc., should be fenced in with barbed wire and floored with stones or brickbats, with the addition of racks of sleepers for the forage dump, the forage itself being covered with tarpaulins.

(17) *Transport and Riding Stables, Harness Rooms, and Motor Garage.*

These can comprise one block of buildings (see Nos. A17-A19).

It is always advisable to have an additional stable for hospital transport and riding horses, and separate from hospital stables proper. There should be an inspection pit in motor garage. The harness room should be lined and floored with wood, and stove supplied. The structure of the stables will be the same as those of the hospital proper, and there will be separate water-trough (A17 (a)), dung pit (A20), etc. Outside standings, however, can be dispensed with.

(18) *Petrol Store (A21).*

This should stand by itself well away from any other buildings.

(19) *Dung Loading Platform (A3).*

This should be so constructed that trucks can run on it lengthwise and tip the dung into waiting carts alongside. Its location will depend on the existing country roads, the position on the plan being provisional.

(20) *Thresh Disinfector (G and Z (1 and 2)).*

This should be placed in a building in the vicinity of the dip. The building should be so constructed that the machine can be drawn in and out of it when necessary.

(21) *Admission Lines (C).*

The importance of these is dependent largely on the class of hospital concerned. In a reception hospital, subdivisinal stables are used, as animals remain in them pending malleining, sorting, disposal to other hospitals and convalescent horse depots, casting and destruction. Further cases which require immediate surgical interference, and some of those which are likely to be fit for re-issue in a short time, are treated in this class of hospital. In other hospitals the accommodation may be of a more temporary nature, such as outside standings, as animals ordinarily occupy them only pending posting to subdivisions, and which is carried out at the earliest possible moment after admission.

(22) *Green Forage.*

During the war a scheme for the cultivation of green forage (crops and roots) for sick animals was initiated. It was arranged to allot 100 acres of ground for this purpose to each hospital, but the war ended before the scheme had time to materialise. Ground for this purpose should be obtained as near the hospital as possible.

(23) *Accommodation for Personnel.*

(a) *Dining Rooms (B1 and B2).* Sufficient accommodation should be provided to permit of all taking their meals at the same time. This can be carried out by either one large or two small dining rooms. They should be lined with wood and have wooden floors. Stoves should be provided for cold weather. Separate small tables to seat six or eight men are preferable to large, as

the men can then be divided into messes. At the end of each room should be provided, on one side, a pantry (B1 and B2 (a)) with water laid on to sink and shelves; on the other side, a store (B1 and B2 (b)) for accommodation of the day's rations. There should be plenty of windows, and they and the doors protected by fly-proof gauze.

(b) *Cookhouse* (B3). This should also be wood-lined and floored except for area covered by cooking ranges, which should be concrete, this being centrally placed. At one end a meat store (B3 (a)) should be built on to the cookhouse, communicating with it directly by means of a door; at the other end ration and grocery stores (B3 (b) and (c)) should be built with direct communication to the cookhouse. Every door leading to the outside should be fitted with additional fly-proof gauze doors, and the windows should be similarly protected. Ridge ventilation is advisable in a cookhouse, also protection with gauze. Water should be laid on to a sink inside.

It was found that an additional small shed (B3 (d)) for a Soyer's stove for boiling vegetables, water for tea, etc., erected outside near the main cookhouse door, was a great use, in fact a necessity.

A point of great importance in this group of buildings is the drainage system. If sub-soil drainage is being used the provision of adequate grease traps, water seals, and inspection pits is essential. There should be a large concrete slab (B3 (e)) outside the cookhouse door. The refuse tins can occupy one end of it.

(c) *Bath-house, Ablution and Drying Rooms* (B4 (a), (b) and (c)). These can be comprised in one block of buildings:—

- (i) *Bath-house* (a) should contain sitz, shower, and steam baths in cubicles, with wooden seats and gratings as required. Floor to be of concrete. Large boiler to be installed.
- (ii) *Drying Room* (c) to be placed near bath-house, and heated by means of steam pipes from bath-room boiler. Supports to be suspended from roof for drying men's clothes. The floor should be of wood.
- (iii) *Ablution Room* (b) with zinc-covered benches around the walls to hold wash bowls. Water should be laid on with taps at intervals. Plenty of windows, and concrete floor.

(d) *Serjeants' Mess* (B5), comprising ante-rooms and dining rooms, kitchen and scullery, steward's pantry and bar, and bunk for regimental serjeant-major (marked (a), (b), (c), (d) and (e) respectively). The same principles as regards accommodation, structure and drainage, etc., as for men's messing, cooking, etc., should apply here, modified according to accommodation.

(e) *Corporals' Mess* (B6) is recommended. It affords an opportunity for junior N.C.Os. to take their indoor recreation, etc., apart from the men. A bar should be installed at one end.

(f) *Canteen Recreation Room* (B7) to be lined and floored with wood; stoves for heating; grocery and coffee bar at one end, with ordinary bar at the other; plenty of tables and seats.

(g) *Huts for* (i) Members of serjeants' mess (B8); (ii) Men (B9). A variety of huts were used during the war, such as Aylwin (canvas), Nissen (iron), and French sectional (wood), as well as tents of different sorts. Wooden floors should be provided for all, and stoves for large huts.

(h) *Urinals and Latrines* should be located in rear of the subdivisional stables (M), on the extreme right of the men's camp (N), and behind the orderly-room (O), the latter to contain accommodation for officers. A special incinerator for use in this connection, with a concrete-floored shed, with water laid on and tools for cleaning buckets, should be provided (N1).

(i) *Parade Ground* (D). This should be fenced in so that it can be used as a paddock for special cases in addition to its legitimate use. It can also be used as a sports field.

(j) *Sports*. Provision for outdoor recreation for the personnel should be provided in the shape of fields for games, etc.

(k) *Vegetable Growing* should be encouraged, and land obtained adjacent to the hospital, if possible, for this purpose, so as to render the hospital self-supporting in this respect. This was effected in many hospitals during the war. The spaces between the subdivisions (marked P-T) can also be utilized for this purpose

(24) *Accommodation for Officers*.

Failing the availability of a house in the vicinity of the hospital, the officers will be accommodated in huts. The same principles of construction, with provision for messing, quarters, etc., as for the rank and file should be followed but modified according to circumstances.

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In the absence of natural boundaries, hedges, etc., the whole hospital should be fenced in.

CHAPTER XXVI.

CAMEL HOSPITALS IN EGYPT.

Organization of the Hospitals.

THESE hospitals were modelled on the same plan as the horse hospitals of the corps, but were much more economically run, especially in the British personnel required and the few buildings necessary. Each hospital was organized as a complete unit, being self-contained, independent, and capable of accommodating 1,250 camels. It was so organized as to be capable of being split up into five subdivisions for 250 patients each, in the same way as other similar veterinary establishments. Each division was a complete unit in itself and capable, if necessary, of being detached from the parent hospital.

The following table shows the establishment of personnel and how the duties were distributed :—

A Veterinary Hospital to accommodate 1,250 Camels.

Rank.	Number.	Details of duties (which may be varied to suit requirements).
Major	1	Commanding.
Quartermaster ..	1	
Veterinary officers (Egyptian).	5	One for every two subdivisions.
Warrant officer (Class 2)	1	One office.
Staff-serjeant ..	1	One general duties.
Serjeants	5	One for every two subdivisions of 250 camels. General duties.
Corporals	10	One forage; one pharmacy; one operations; seven general duties.
Shoeing-smith corporal	1	Forge-operations.
Native clerk	1	Office.
Native saddler ..	1	Repairs head collars, tents, saddles, etc.
Native clippers ..	5	One for every two subdivisions of 250 camels.
Termurgies	15	Three for every two subdivisions of 250 camels (native dressers).
Bash Rais (chief head-man).	1	
Rais	15	Five general duties; two for every subdivision of 250 camels.
Syces	420	Nine batmen (two for C.O., five for native officers, one for officers' mess, one for serjeants' mess); eleven general duties; 400 for grooming.
Total—all ranks ..	483	

British Officers.

As far as possible the commanding officers were selected for their previous experience with natives and, if possible, a knowledge of local conditions. These qualifications and a knowledge of the Arabic language were of very great advantage to the smooth working of the machine. The other British officers were also carefully chosen ; this was very necessary to enable the mixed staff of British and Egyptian personnel to work together harmoniously, a circumstance on which the success and the efficiency of the hospitals largely depended.

Egyptian Veterinary Officers.

These officers were recruited, with one exception, either from the veterinary staff of the Egyptian Government lent by the Director of that service, or from newly qualified men who obtained their diplomas during the war. All held diplomas granted by the Egyptian Government School of Veterinary Medicine, Cairo ; all were given the temporary rank of lieutenant of the Egyptian Army (Mulazim Awal) and in one case captain (Yusbashi), and were attached to the A.V.C. In the first instance, one of these officers was posted to each company of the Camel Transport Corps, but later on they were replaced by British serjeants, A.V.C., and the veterinary officers were transferred to the hospitals (with the exception of two who did duty at the Camel Transport Corps depots) where it was thought that they would be more usefully employed. These officers did very useful work. Each was in charge of the veterinary work of a hospital ward, and was responsible for the treatment of the patients. The actual dressings, including also the treatment for mange, was carried out by the termurgies (dressers) under their direction.

It was very gratifying to see the harmony and good fellowship that existed between the Egyptian officers and the British staff employed in the hospitals ; the fact that this was so reflects credit upon both.

British Other Ranks.

These men were selected from the staffs of the horse hospitals, volunteers being called for as required ; likely men, after a course of instruction, were given promotion for duty either in camel hospitals or as serjeants, A.V.C., attached to companies of the C.T.C. or I.C. Brigade. The class of man so obtained was very good, and most of them did excellent work, which said much for the discretionary powers of the officers commanding the horse hospitals who had selected them. Although the duties were quite new to them, they quickly made themselves acquainted with the camel and his ways, and many of them became quite proficient in colloquial Arabic. Some were professional farmers and took just as much interest in the camels under their charge as they would have done had the camels been cattle on their own farms. The way many of them managed the natives under them, and the interest and pride they took in their gangs, contributed greatly to the efficiency of the units.

The Native Staff.

When the first two hospitals were formed, the whole of the native staffs, including raices (headmen), dressers, clippers and syces, were recruited personally by the commanding officers. The class of man thus obtained was very good, but later on, when the Egyptian Labour Corps and the Camel Transport Corps had swallowed up so many of the available men, it became increasingly difficult to obtain as high a standard of native. The period of enlistment was at first for six months, but this was finally changed to a three months' contract with the option of renewal, leave being granted on full pay with a return railway warrant to and from their villages between engagements, if desired. With the camel hospitals in a military zone, it was soon found to be impossible to recruit locally, and indents were made for native labour through the usual channels by which labour was supplied. No. 1 Camel Hospital, not being situated in a military zone, was enabled to recruit its own native staff during the whole period, merely registering the men through the labour offices. This was a great advantage, as it enabled a much more suitable type of man to be engaged. For instance, an officer commanding a hospital stated that, in a batch of men sent to him, four were quite unfit for work owing to chronic disease, and two or three were totally blind, not to mention the men who, by their previous occupations, were absolutely unfit to attend camels. The engagements were voluntary, but many of the men served throughout the whole period, being re-engaged several times. They greatly preferred to be in the Cairo area, and felt themselves much freer than they could possibly be in a military zone. It was at first thought that the Arabs, owing to their previous experience with camels, would make the best camel-men, but it was soon found that they were not nearly so satisfactory as the Egyptian "fellah," especially the "saidi" from Upper Egypt. The Arabs made fair dressers and were useful for riding and exercising the camels, but were not so amenable to discipline, and had no idea of cleanliness or of keeping their lines tidy or orderly. As a rule, four camels were allotted to one man. This number was found to be quite enough if they fed, watered, groomed, and exercised them properly.

Competitions were arranged between the different gangs of natives from time to time, and prizes were given for the best kept lines and the best managed camels. This had an excellent effect, stimulating friendly rivalry and gaining the maximum efficiency with the least possible compulsion. Sports were also organized, and as much liberty as was compatible with military exigencies and efficiency was given, all of which helped to keep the men healthy and contented.

At No. 1 Camel Hospital, about a third of the men came from one village called Mohasna in Guirga Province, Upper Egypt.

The Egyptian "fellah" is exceptionally clannish and works much better with his own villagers, though it was found advisable to have a fair sprinkling of men from other districts amongst their

gangs to prevent any possible intrigues. The native staff, considered all round, when properly chosen and managed, made excellent camel attendants, and the undoubted success of the hospitals was largely due to their efforts.

The pay of Egyptian personnel was as follows :—

				<i>Piastres.</i>		<i>Egyptian Pounds.</i>	
Clerk	..	..	..	—	..	9	per month.
Bash Rais	..	..	..	12	..	—	per diem.
Saddlers	..	..	..	12	..	—	..
Clippers	..	..	..	12	..	—	..
Rais	..	..	..	9	..	—	..
Termurgies	..	..	..	8	..	—	..
Syces	..	..	..	7	..	—	..

Laying Out of the Hospitals.

Naturally, the plan of laying out the hospitals depended to a great extent on the site and on the individuality of the commanding officer. The first aim was to secure ease and economy in working, and comfort for the patients by utilizing all available shelter, both against the sun in summer and the cold winds in winter. The headquarters were situated as centrally as possible, and usually consisted of tents. In some cases wooden or mud huts were erected, but these were of an inexpensive and simple kind. They consisted of the orderly tent, quartermaster's stores, British and Egyptian officers' tents, and tents or huts for the British personnel. The natives were also supplied with tents, which were pitched, if possible, near the lines on which the men were employed, or all together in a type of cantonment according to the discretion of the officer commanding. Camels were kept either tied up on lines or loose in kraals. At No. 2 Hospital the kraal system was almost universally adhered to and was very successful. The camels were arranged in wards according to the nature of their ailments or disabilities, the surgical wards being, as a rule, as near as possible to the pharmacy; the debility cases, which needed less attention, were further afield.

A short description of No. 1 Hospital^ø will give some idea of the general plan adopted. The site was an elongated, slightly triangular piece of ground running north-east and south-west, bounded on the one side by a railway line and on the other by a small canal. At one end was a large square space used for parading camels for inspection, and around this were the headquarter offices and living quarters of the officers and European staff. Slightly in a hollow, and at some distance from the tents and square, was a level area, surrounded by tall eucalyptus trees, used as a clipping ground, and near this was another area on which the mange cases were scraped and dressed. The ground on which the camels were kept was divided longitudinally by a central road, on the south-west side of

^ø See plate facing page 158.

which was a wood of tall eucalyptus trees giving excellent shelter. On the other side of this road, except for a small area at the north end, the trees had been cut down. There were a few trees dotted here and there over the open side, but not enough to give much shelter. Fortunately the trees had been planted in straight rows, and it was possible to make one camel line between each row of trees, the distances apart being approximately thirty-three feet. The lines on the shady side of the ground were arranged parallel with the road, while those on the open side were at right angles to it. At the north end, the trees were not so regularly planted, and here five kraals were erected. The shady side of the hospital was divided into two wards, "A" and "B."

"A" ward was purely surgical, being reserved for all the severe cases of wounds and lameness. Behind "A" ward were a few lines used respectively for fever cases and for cast camels, either for sale, slaughter, or destruction. There was also a small kraal in connection with these lines for any special cases, such as trypanosomiasis. "B" ward consisted, for the most part, also of surgical cases, such as sore pads or others that "A" ward could not accommodate. Included in this ward were isolation lines for the treatment of cases of "latia" and camel pox. "C" ward consisted of five kraals and one line, and was used for debility cases. "D" ward was on the exposed side of the ground and was used as a general ward for slight surgical cases and less severe cases of debility. In this ward were special lines reserved for cow camels. "E" ward, which was opposite to "A" was really the convalescent ward. Camels that had recovered from their various complaints and were free from mange were transferred from the other wards to "E." All camels for discharge were selected from this ward. It was divided into three divisions, one for baggagers, one for riding animals, and the third for the convalescent cow camels. As there were no riding or transport camels allowed on the hospital establishment, any camels required for riding or transport purposes were selected from among the convalescents.

Operating Theatres.

Each ward was provided with its own operating ground. These were level areas surrounded by low mud walls, and were large enough to allow of two or three camels being cast at once. Those of the surgical wards were the largest and most used, but even in the convalescent ward it was sometimes necessary to cast camels for minor dressings. A special operating ground was made near the pharmacy and kept exclusively for castrations and other major operations. At other hospitals there were sometimes large central dressing sheds erected where all cases requiring operation or dressings were brought daily from the different wards.

All operations were carried out in the open air; this was the most satisfactory arrangement as the rainfall is too small in Egypt



A camel hospital ward.



Camel dipping bath.

to cause any serious inconvenience, and, further, the sun was not prevented from exercising its sterilizing effects on the ground. Major operations, such as castration, of which many were carried out for a variety of reasons, were performed under an anaesthetic, intravenous injections of chloral hydrate being chosen. This was found to be the most satisfactory form of anaesthesia for the camel ; it caused less struggling and distress to the patients than chloroform, and its anaesthetic effects were quite as complete. Out of a very large number of camels anaesthetized by means of this drug two casualties only can be recorded.

The Camel Lines or Standings.

The type of standing adopted was as follows : a thick, low mud wall was built up along the front of the line to hold the mangers. This wall was about 1 ft. 4 in. high and 4 ft. 6 in. broad. In the centre of this a basin-shaped manger was scooped out about 1 ft. 9 in. deep and 2 ft. in diameter. The distance of the mangers from centre to centre was about 7 ft., leaving about 5 ft. from edge to edge. In front of each manger, for tying up the camels, there was an anchor block consisting of an iron peg with a ring at the top. The peg was put through a block of wood with a ring at right angles at the end so that it could not be pulled out. The block was sunk in the ground about 2 ft. deep so that only the ring on top of the peg remained above the surface. The buried portion was covered up with earth, which was well beaten down ; when thus fixed it was impossible for a camel to pull it out. This method was evolved after many trials with other devices, and was found to be the best for a standing camp or hospital. The depth of the standing for each camel, including the manger, was about 20 ft., which gave ample room for the largest animal. The ground was kept soft by being raked over and fresh sand added from time to time as required. At the back of the standings, running parallel with the mangers, was a mud ridge, about 6 in. high to act as a border. Between this ridge and the front of the next row of mangers was a pathway of about 13 ft. in width. The paths so formed were well beaten down and finally became as hard and smooth as a good garden walk. The length of each line varied with circumstances, but it was found that fifty camels were quite enough to have in one row without a break. As a matter of fact, no more than forty camels were placed in one row in this hospital ; in many lines the number was much less.

The Kraals.

These were enclosures made of rough fencing, about 5 ft. 6 in. high, usually consisting of three bars. The camels were turned loose in these kraals, and if carefully selected did very well. It was necessary to put the same class of animals together and to remove any which attempted to bully the others. During the

rutting season, any camel which became dangerous was removed. On occasions cow camels were turned loose with males, but strange to say they took but little notice of each other. A row of mud mangers, similar to those previously described, was made along the fence, and during feeding time it was advisable to tie up the camels (at least the stronger ones), in order to prevent them from eating more than their legitimate ration. At No. 1 Hospital there were five large kraals capable of carrying from fifty to eighty camels each, according to their size. It was found that at least 36 sq. yd. a head were necessary, and the more room they were given the better they fared. Bites and injuries amongst these camels were remarkably few considering the large numbers kept together. At this hospital bad cases of wounds were not put in the kraals, as it was thought that they did better on the lines where they could be kept more under observation, but at No. 2 Hospital the kraals were used for all classes of cases with apparently good results.

Registration of Patients.

On admission a small disc, stamped with the number to be given to the case, was attached to the headstall of every camel. This number was entered in the hospital register and served as a recognition mark during the time the case remained in hospital.

Management of the Camels.

Feeding.—The standard camel ration was :—

Millet	.. .. .	10 lb.
Tibben (chopped straw)	..	12 lb.

This was augmented by grazing whenever possible ; in some of the hospitals grazing parties were sent out and were sometimes away as detachments for weeks at a time. At No. 1 Hospital grazing was not possible. Green fodder was supplied, when available, and the animals were fed on the lines or in the kraals. This consisted either of Berseem (a species of clover, *trifolium alexandrinum*) or green maize, and was given as an equivalent ration in lieu of some of the grain or tibben, according to the table of equivalent values issued from time to time. It was found that debilitated camels did not do well on millet, a large proportion of which passes through the digestive system whole. In fact, in the writers' opinion, millet—which is the chief grain given to riding camels in this country—is for this reason a most unsatisfactory and wasteful ration. Consequently trials were made of other grains, the best of which was gram imported from India. This was used crushed whenever available and gave excellent results. Crushed beans, the staple food in Egypt for cattle and baggage camels, were very good, and camels also did very well on crushed barley despite the prejudiced opposition to this grain as a camel food by camel men. Linseed and cotton

cakes were also used as a substitute for part of the grain ; they were given in equivalent quantities and proved of great value, especially the former. A preparation known as " compressed forage " was also used for a time. This consisted of barley and wheat sweepings mixed with fine tibben, the two former being a by-product of certain flour mills. The camels ate it well, but it was very liable to be dusty, and it was difficult to gauge the real feeding value owing to the varying quantities of grain actually present. The grain or its equivalent was given twice a day, morning and evening, mixed with tibben, and tibben was also fed to the camels at mid-day, with or without green fodder. " Dries " (a form of clover hay) was sometimes included in the ration and was a very valuable food, but its price prohibited its use in any quantity. Imported Algerian hay was issued for a time, but it was not much appreciated and did not appear to have a very good feeding value, being made from very coarse grasses.

Watering.—The vexed question in camel management, as to how often camels should be allowed access to water, was not allowed to become acute in the hospitals. One school of thought held that if camels were watered daily while resting they became incapable of performing long marches when water might be scarce ; another considered that by giving insufficient water when there was no shortage, the camels had their constitution so undermined that, when the crisis of a long march came, they were like an over-trained racehorse, and collapsed more readily from fatigue. Undoubtedly many considerations must be taken into account, such as the kind of camel, the food given, climatic conditions, etc., but there is no doubt that more valuable camels have been lost by pushing too far the latter theory than the former. As the hospital cases were sick, the commonsense view was adopted, and the camels were allowed water every day. At No. 1 Hospital this was supplied from a well, and the animals were all watered out of wooden troughs once a day on their return from exercise. There was some criticism to the effect that camels were discharged from hospitals in a soft condition and that they lost a great deal of condition when put to work. In some cases camels in the discharge ward were watered only every other day, but as a rule it was left to the Camel Remounts to limit the amount of water given to the animals sent them as they thought fit.

Exercise.—All camels, unless lame or otherwise unfit, were exercised. They were given about an hour's walk every day outside the hospital. On very cold days, and likewise on very hot ones, the camels were often sent out a second time in the afternoon in order to keep them warm in the former circumstance and to prevent them from succumbing to heat stroke in the latter. It was found that on the hot oppressive days which were liable to produce heat stroke the best preventive of this condition was to keep the camels moving during the critical period of the day.

Grooming.—This was considered to be of the utmost importance, and all camels that were not covered with mange dressing were regularly groomed, an hour being allotted daily for this purpose.

Shelter.—Debilitated camels being very susceptible to extremes of heat and cold, it was necessary to place them in the shade as much as possible during the summer. High mud walls were built on the exposed aspects of the ground as a protection against the cold winds in winter. The site of No. 1 Camel Hospital was much sheltered, but even here the walls built, which were six feet in height, were found to be of the utmost benefit to the patients. It was not possible to provide shelter against the rain (fortunately the wet season in Egypt is short) and when rain did occur the camels suffered severely from it. The camel can stand dry cold fairly well, but wet cold always causes considerable loss among debilitated animals.

Rugs.—During the winter season, rugs were provided for all camels; many of the weaker ones were given two, or in some cases three, at night. These rugs were of the pattern used for all camels of the force and had a portion cut out for the hump. It was proved over and over again that rugs were an absolute necessity, especially for weak and debilitated camels when clipped and under treatment for mange, if excessive losses by death from cold and exposure were to be avoided. The advisability of rugging camels was a difficult question depending upon a choice between two evils. If left unrugged the animals suffered from exposure to cold: if rugged, the parasitic infection might be spread by means of the covering. Even at the risk, however, of infecting some clean camels with mange, rugging was found to be a wise measure. Moreover when the camels' backs had been smeared with mange dressing the rugs became so plastered with sulphur and oil that the mange parasite had but little chance of living in them.

Incidence of Disease.

A total of 64,639 camels is stated to have been admitted to camel hospitals during the war. This figure, however, includes a very large number of cases that were transferred from one hospital to another, and is therefore considerably in excess of the number of animals actually admitted. Out of this number 40,499, or 62·7 per cent. were discharged cured to remounts or to other camel depots, or transferred sick to some other camel veterinary unit.

No. 1 Hospital, as already stated, was a base and received a large percentage of its cases from other hospitals. Out of 24,618 camels admitted to this unit, 11,123 or 45·1 per cent. were transferred from other hospitals. All these cases were either selected as requiring prolonged treatment or as being unfit for further military service. Thus, every case sent to this unit was kept until it was fit for further service, in which case it was discharged, or, failing this, it had to be disposed of. No cases were transferred sick from this hospital.

The statistics of this hospital are utilized as they can be taken as fairly representative of the cases met with as a whole. The following table shows the percentages of the different conditions; but it must be explained that, owing to the very large number of cases dealt with and to the stress of the routine work, a more detailed classification was not possible.

When a case was transferred from one ward to another, as, for instance, camel pox breaking out in a case already diagnosed as lame, it was not shown in the books as a new case, so that the figure given, i.e. 24,618, is the actual number of camels admitted. It often happened that a camel had more than one complaint; it was then registered under the most important. Thus, a camel having "latia," for example, might in addition be lame and have a sore back, but the case was only shown as "latia." The figures given for the various disabilities are therefore only approximately correct.

Classification of Diseases.

	<i>Percentage.</i>
1. Debility	38
2. Poly-arthritis of Somaliland camels ..	9.8
3. Wounds, general	9.1
4. Sore backs and loins and fistulous withers	7.5
5. Trypanosomiasis (microscopically diagnosed)	6.2
6. Sore pads	6.2
7. Camel pox (variola cameli)	5.4
8. Lameness	4.8
9. "Latia" or "Lahtia" (Indian "Jhooling")	4.5
10. Diseases of the digestive system, includ- ing peritonitis and ascites	2.9
11. Diseases of the chest and lungs other than tuberculosis or actinomycosis	2.5
12. Visual (chiefly blindness)	1.2
13. Tuberculosis	1.2
14. Miscellaneous, including specific diseases other than camel pox and "latia"	0.7
Total ..	100.0

1. *Debility*.—This diagnosis was made in all cases in which emaciation was present without symptoms of anything more definite (excepting mange which was often the cause, but this important disease will be discussed later). Many of these cases had minor sores or injuries not of sufficient importance to warrant admittance to the surgical wards.

The most important causes of debility were :—

- (a) Hard work, forced marches, and the general hardships inevitable in campaign conditions.
- (b) Mange.
- (c) Trypanosomiasis and filariasis.

Probably many of the debility cases suffered from trypanosomiasis or harboured filariae in their blood which accentuated the condition, but the diagnosis of these could not be made until the parasites were actually demonstrated. Sufficient numbers of blood examinations could not be made over a long enough period to ensure a certain diagnosis in every case.

(d) Lack of water.

(e) Unsuitability of the camels for the work required of them. Large numbers of weedy, ill-formed and unsound camels were purchased. This to some extent was inevitable ; in order to get good camels, purchasers were often compelled to take some bad ones, but this could hardly account for all the cases which it was necessary to cast for veterinary reasons soon after purchase.

(f) Extremes of heat and cold, the latter being especially severe on camels when accompanied by wet.

(g) Transport by sea or land after purchase.

(h) Working imported camels before fully acclimatized.

(i) Working camels when too young or, conversely, too old. No camel should be put to work before it is six years old.

Before this age the animal has not attained maturity, and, moreover, between four and a half and six years of age, so many changes of the teeth take place as to render the camel incapable of grazing well and taking full advantage of its food. It is difficult to say what is the limit of old age within which a camel can work, as this varies so much with individuals, but well-preserved camels even up to twenty years old can stand work better than those too young.

2. *Poly-arthritis**.—This name was given to a peculiar form of multiple arthritis met with almost exclusively in camels purchased in Somaliland. It attained the high figure of 9·8 per cent. in this hospital. The condition was a chronic one involving many of the principal joints of the limbs and even of the vertebral column, producing erosion of the articular cartilages and in some cases a rarefying osteitis of the bones themselves. Bad cases were totally unfit for work. The true cause of the disease was never elucidated. The symptoms were lameness and stiffness in action, more or less inability to " barrak " (kneel down) and likewise to get up with a

* This probably is a deficiency disease, and occurs usually in dry, arid areas where camels, usually young ones, obtain good grazing only during a very short period of the year.

load or, in bad cases, even without one. There was no constitutional disturbance, and when the animals were not worked the condition was well maintained. Unless very slight, rest did not appear to ameliorate the condition much, the disease being incurable. The reason why the total number of these cases showed such a high percentage as 9·8 of all admittances was that most of the worst cases were drafted into this hospital for disposal. Accurate statistics were not made of all cases dealt with, but out of 1,154 cases of which records were kept, 901, or 78 per cent., were sold as meat, 173, or 15 per cent., were issued out as fit for light work, while 80, or 7 per cent., died or were destroyed in a moribund state, the causes being advanced debility or gastro-enteritis, conditions to which these camels were specially susceptible.

3. *Wounds, general.*—9·1 per cent. of all cases came under this category in which were grouped together all surgical conditions with the exception of sore backs and humps, due to saddlery, sore pads and surgical diseases of the limbs. The following are some of the injuries met with:—

(1) Head injuries:—

(a) Wounds and even fractures of bones, such as the nasal bones or partial fractures of the lower jaw caused by the chin chain of the headstall.

(b) Complete fracture of the lower jaw due to blows.

(c) Pus in the sinuses of the head due to the presence of larvae of the Camel Bot fly (*oestrus cameli*) or to traumatism.

(2) Abscesses and fistulae. These were often due to suppurating glands caused by filariasis. The chief glands affected were the prescapular, precrural, inguinal, popliteal, and even the iliac glands.

(3) Gunshot and shrapnel wounds.

(4) Other forms of traumatism.

4. *Sore backs and loins and fistulous withers.*—This group is limited to cases of injuries due to saddlery or the carrying of loads. It accounted for 7 per cent. of all cases. The chief seat of these injuries was over the lumbar transverse processes, and when severe these processes were often necrosed. Injuries to the spinous processes were also common and, to a lesser extent, injuries to the withers and hump. In one year, when special records were kept, 90 cases of fistulous withers occurred, accounting for 0·8 per cent. of all cases, but of these only about 30 per cent. were curable or worth treatment.

*5. *Trypanosomiasis.*—As previously stated, no case of this disease was diagnosed without actually finding the causal organism in the blood on microscopic examination. When once diagnosed, a letter "T" was branded on the neck, no matter what condition the camel was in. The impossibility of diagnosing all cases of the disease without constant examinations carried out over a long

* See illustration facing page 608.

period is well known. Experiments carried out at No. 1 Camel Hospital fully bore this out. (See page 255).

The routine carried out for the detection of trypanosomiasis by the veterinary service in the field before the army advanced in 1918 was as follows:—

- (a) The temperature of camels was taken between 5 a.m. and 7.30 a.m. for seven days in succession.
- (b) Blood films were taken from camels showing a temperature of 100° F. or over.
- (c) Camels with high temperatures were carefully numbered and kept together.
- (d) Camels which gave a negative result on first blood examination were kept under observation, and if the temperature remained high blood films were taken on three successive occasions.
- (e) When daily examination was impossible, the temperature examination was carried out on resting days.
- (f) When it was impossible to take temperatures in the evening they were taken in the morning, and those showing a rise to 103° F. or over were looked upon with suspicion.
- (g) Camels diagnosed with trypanosomiasis were branded with the letter "T" on the neck before evacuation.
- (h) In making films, careful disinfection of the knife was carried out between each bleeding to prevent the possibility of direct inoculation. In addition, camels selected for issue from remount depots had their temperatures taken in the morning the day before issue and those which showed over 100° F. were similarly dealt with. Before the advance into the Jordan Valley it was considered advisable to publish an annexure to general routine orders calling attention to the danger of trypanosome infection and advising the measures to be adopted in the infected areas.

Out of 17,059 camels so examined in the force in 1918, 432 or 2.53 per cent. were proved to be infected. This system undoubtedly enabled the Veterinary Service to pick out the great majority of the cases. All camels found to be infected were sent to veterinary hospitals for further observation after being branded. Owing to the shortage of camels it was not considered advisable or necessary to destroy all camels so affected, but those in good condition and otherwise fit were drafted out and issued to companies working on lines of communication in non-fly areas, where they were kept separate. When the campaign was over and they were no longer required, they were all returned to veterinary hospitals and slaughtered. When fit, the carcasses were passed as food, but when unsuitable they were condemned. No known cases of trypanosomiasis were sold on demobilization owing to the fear of spreading



Advanced case of Trypanosomiasis.



Camel Pox.



A severe case of Lahtia.



Advanced case of Tuberculosis.

the disease in Egypt and Palestine. The policy of slaughtering only the camels badly affected and working those physically fit during the campaign was more than justified by the results obtained.

In No. 1 Hospital, 1,526 cases were recorded. These were from two sources: (1) those admitted with the brand "T" on the neck, indicating previous diagnosis, and (2) those examined in the hospital and found positive. Latterly all camels showing any suspicious symptoms were examined in this hospital by the method indicated above, and all camels in the discharge ward were submitted to a daily temperature test, blood films being taken in any case of rise above normal, to ensure, as far as possible, that camels harbouring the parasites were not sent to remounts without being branded. Approximately 60 per cent. of the cases detected showed debility and were unfit for work. Those which were sent out stood their duties remarkably well, and many were re-admitted at the end of the operations in excellent condition. No special treatment other than good food and management was tried in the hospitals.

Trypanosomiasis accounted for 6.2 per cent. of cases in this hospital. Some discussion arose as to whether the trypanosomiasis met with in Egypt was identical with the Surra of India. Taking all considerations into account, the weight of evidence pointed to its being another form of the disease, milder in character and probably due to some other form of trypanosome.

6. *Sore Pads*.—It is most essential that the sternal and other pads should be in a sound and healthy condition, as any malformation, wounds, or other injuries to these, prevent the camel from resting properly, or cause lameness, thus affecting its usefulness. This class of disease reached 6.2 per cent. of the cases in the hospital. The following conditions were met with in the sternal pad:—

- (a) Malformation of the pad.
- (b) Bruises due to elbow "brushing."
- (c) Tumour growths on the pad, chiefly fibromata, usually on the posterior borders.
- (d) Fistulae of the pads, in serious cases involving the sternum itself.
- (e) Spongy condition of the pad.

Injuries to the elbow pads were of next importance, any wound or bruising of these being extremely difficult to heal. All conditions of the pads in which any abnormality is found are slow and tedious cases to deal with, and frequently it was impossible to do more than patch them up. A special and most excellent pad-protecting cover was largely used. This was devised by Lieut.-Colonel A. de R. Gordon, A.D.V.S. to the Camel Transport Corps, and consisted of a padded cushion made of thick canvas, attached by webbing over the withers and behind the hump. Care had to be exercised in tying it on in order to prevent its cutting the skin of the back. The pad was largely used, both in hospitals during treatment and on the line

of march ; consequently, it was possible to use many camels which otherwise would have become casualties. Only the worst of these cases were sent into the hospitals.

*7. *Camel Pox (variola cameli)*.—This disease accounted for 5·4 per cent. of the admittances. Two varieties were met with : (a) the discrete ; (b) the confluent. The disease was most severe in the winter months, when complications such as pneumonia were likely to occur. The death rate was low, and certainly did not exceed 3 per cent. It is interesting to note that in some cases this disease was transmitted to the men, in whom, however, it ran a mild and localized course.

8. *Lameness*.—4·8 per cent. of cases were of this class. They included sprains, injuries to the feet, knees and hocks, and injuries to and diseases of the bones and joints. During the period of compulsory sales in Egypt early in the war, many cases were due to injuries inflicted by the owners.

†9. "*Latia*" or "*Lahtia*."—This condition, which appears to be identical with what is known as "Jhooling" in India, and "Neyeta" by camel-men, is a sort of localized septic sore which breaks out in certain parts of the body. The true cause was never determined, but the condition was to some extent contagious. It attacked camels of all kinds, both in good and poor condition. If properly treated it was not often severe, but if the sores were cut open too soon they were liable to become generalized, often ending fatally. The cases were always isolated in special lines, and amounted to 4·5 per cent.

10. *Diseases of the Digestive System*.—2·9 per cent. of cases fell into this group. It included :—

- (a) *Diarrhoea*. This was most common in the winter months, and occurred especially in Sudanese and Somaliland camels, in which it was very fatal. In some cases it was parasitic in origin.
- (b) *Peritonitis*. A terrible and peculiarly fatal disease of the camel due to a variety of causes, such as cold, wet, penetration of a foreign body into the stomach, the presence of *linguatula taenioides* larvae (according to Leese), and other undetermined causes.
- (c) *Ascites*. Common in old and debilitated camels, and probably due to trypanosomiasis or cirrhosis of the liver in some cases.
- (d) General conditions, such as impaction of the rumen, tympany and colic. These as simple conditions were very rare and quite transient.

11. *Diseases of the Chest*.—These conditions accounted for more than 20 per cent. of the total deaths in the hospital, and 2·5 per cent. of all cases. They were made up of cases of pleurisy, pneumonia,

* See illustration facing page 608.

† See illustration facing page 611.



A case of Tetanus.



Severe case of Mange.

lung abscess, and parasitic bronchitis. Echinococcus cysts (*echinococcus veterinorum*) whose mature form, *taenia echinococcus*, occurs in the dog, were present to such a large extent in the lungs that 80 to 90 per cent. of all camels of which post-mortems were made were found to suffer from them. Only when they were specially numerous and generalized, which was not very common, were they responsible for death. Lung diseases were most numerous in Egyptian and Sudanese camels, next in frequency in Algerians, rare in Indians, and practically unknown in Somali camels.

12. *Visual*.—1·2 per cent. of the total cases. They were chiefly made up of blind camels sent in for disposal. At one time it was thought that these blind camels could work in the companies, but it was soon found that they were unserviceable, being liable to fall, and were in any case too slow to keep up with the column. A few were used for light work in the hospitals. Trichiasis and entropion were frequently seen, especially in old Sudanese camels. Numerous operations to relieve these conditions were most successfully performed. There were many more of the two last named conditions than were recorded, for many camels under treatment for more important ailments were often treated for these conditions as a minor matter.

*13. *Tuberculosis*.—Only a few camels were submitted to the tuberculin test which, however, appeared to be satisfactory as a diagnostic agent in the camel. The cases recorded are only those which proved to be tubercular on post-mortem examination. Confirmation of the diagnosis in cases where there was any reasonable doubt was often obtained from the Veterinary Pathological Laboratory of the Egyptian Government Veterinary Service. In the camel the disease appears to be mostly accompanied by symptoms of debility. The number found was 260, and reached just under 1·1 per cent. of the total admissions. The lungs and chest walls, with their associated glands, were nearly always the seat of the lesions; next in frequency came the spleen, which organ was always affected when there were any lesions in the abdomen. Tuberculosis was most common in Egyptian and Algerian camels, rare in Indian, only one or two cases were seen in Sudanese, and, as far as the writer can remember, no case at all was demonstrated in a Somali camel. The lesions seen were nearly always of a very chronic nature, even when they had again become active. Apparently few, if any, camels actually contracted the disease after purchase.

14. *Miscellaneous*.—Various conditions which cannot be classified in the above groups amounted to 0·7 per cent. Amongst these may be mentioned a few cases of actinomycosis in Sudanese camels, one case of anthrax (though two occurred in the adjacent camel remount depot), four cases of tetanus, one or two of meningitis, and several of heat apoplexy. A word about heat apoplexy may be of interest. This condition generally occurred in debilitated camels, especially among those which had recovered from mange. The onset was very sudden, the temperature running up to 112° F. or

* See illustration facing page 611.

over; the camels so affected became very excited, finally falling down in a comatose condition. If taken early, treatment, which consisted of bleeding from the jugular vein, the administration of stimulants, and the application of ice packs to the back of the head, was most successful. This was of course not often possible. The trouble occurred on very hot, close days, usually without the direct rays of the sun, but when the atmosphere was very oppressive. At No. 4 Camel Hospital 111 camels died one afternoon while out grazing, all the deaths taking place within six hours. At No. 1 Hospital, out of 73 cases noted, 30 recovered and 45 died, either immediately or had to be destroyed owing to paralysis supervening.

*Mange.**

It may be thought surprising that no mention has been made hitherto of this most important and troublesome disease in the classification of disease. The reason is that orders were given that no camel affected with mange was to be admitted to hospital merely because it was suffering from this malady alone.

Mange in the camel is due to a sarcoptic parasite, *sarcoptes scabiei*, var. *cameli*. It is a small parasite, about 1/100 to 1/60 of an inch in length, and found in tunnels deep down in the thickness of the skin. Hence it is a difficult and most troublesome parasite to eradicate. This is the only form of mange occurring in the camel.

It was recognized at the outset that it would be aiming at the impossible to try to eliminate mange completely from the camels employed. To have evacuated all cases into hospitals as they occurred would have crippled the various companies in the field. Adequate arrangements were made by the Veterinary Service for dealing with mange in the units; and the worst cases were evacuated only when military exigencies made it impossible to keep it in check. Despite these arrangements, large numbers of camels suffering only from mange were sent to No. 4 Camel Hospital, on its formation, from the Imperial Camel Brigade. A very large number of camels were admitted to other hospitals suffering from mange when debility had become severe. Probably in no previous campaign in which camels were used were such thorough and persistent measures taken for the prevention and treatment of this malady. Despite these efforts, mange affected a large number of camels in the Camel Transport Corps from time to time; that it was kept well in check, and only in rare cases incapacitated the animals from work, was due to the indefatigable and never ending efforts of the A.D.V.S. and veterinary staff attached to the corps, ably assisted by the officers and men of this corps itself.

In the Imperial Camel Brigade the state of affairs was far less satisfactory, and several severe outbreaks occurred amongst its camels. This was greatly due to the nature of the work on which

* See illustration facing page 615.

the brigade was employed, to other difficulties, and to objections against riding on camels covered with mange dressing. It cannot in any way be put down to lack of zeal or care on the part of the veterinary staff attached to the brigade.

Large batches of camels being frequently sent into hospitals at the same time, it was quite impossible to prevent the mangy and non-mangy animals from coming into contact with one another on the road. Even in the hospitals, where the available space was sometimes very limited, it was a physical impossibility to provide really adequate isolation. The mangy camels were separated from the clean ones in the wards to which they were admitted, but the only practical method was to treat them all as suspects, even if no lesions of the disease could be discerned.

The method adopted was to clip all camels as soon as possible after admission, care being taken to deal with the worst cases first. Too much stress cannot be laid on the necessity and benefit of good clipping. The affected camels were scraped over after clipping, and dressed either all over or locally as required. Clipping facilitated the examination of the animals, and enabled those showing the lesions in their early stages while in hospital to be dealt with at once before the disease spread. Really bad cases required clipping a second, and sometimes a third, time while under treatment before they could be considered properly cured. Space does not permit of a treatise on camel mange being written here, but it may be valuable to state that of all dressings used, the old formula consisting of sulphur, carbonate of soda and whale oil, was the most satisfactory. Amongst other dressings tried were Stockholm tar, colocynth tar, paraffin emulsion, and calcium sulphide.

Three dressings were considered sufficient for moderate cases, but were quite inadequate for really bad ones, some of which required five or six applications. It was well proved that the type of dressing used, important though this was, was not really of so much account as the care and thoroughness with which the treatment adopted was carried out. The treatment by means of fumes of sulphurous acid gas, so well spoken of for the treatment of equine mange, was not used for camels. A few camels were experimentally subjected to this gas at No. 16 (Horse) Veterinary Hospital, Kantara, but not in sufficient numbers to warrant any opinion being given as to its efficacy in camel mange.

**The Camel Dipping Bath and its Use.*—A dipping bath was installed at No. 1 Hospital in order to try the effect of the calcium sulphide solution so much used in horse hospitals. The treatment was given a fair trial, but it could not be considered a success in bad cases where the skin was much indurated and scabs were often as much as an inch in thickness. The bath was finally used for washing the camels with soap and hot water, and served the most useful purpose of cleaning them before discharge or when necessary before dressing.

* See illustration facing page 598.

The greatest care was always taken not to discharge any camels out of hospitals until they were thoroughly cured of mange and the oily dressing had been removed. As a general rule the camels were washed once or twice in a neighbouring canal and well rubbed over with fine sand to remove the greater portion of the dressing, and finally finished off in the bath before discharge to remounts. The bath was made of concrete and had gently sloping ends and steeply sloping sides. At each end was a sloping concrete platform which allowed the drippings from the animals to flow back into the bath. It was filled from a tap, but had to be emptied by means of a hand pump or buckets. A large boiler heated by a coal fire injected steam into the bottom of the bath, which could bring the water up to any temperature. The actual temperature used was about blood heat as a rule.

Measurements : Floor, 12 ft. 3 in. by 2 ft. 6 in.

Top, 68 ft. 0 in. by 7 ft. 2½ in.

Depth, 7 ft. 0 in.

When filled to a depth of about six feet, its capacity was a little over 6,000 gallons.

The bath was filled to the level of the camel's withers, and the camels were led to the end and gently induced to enter the bath by means of a rope round the thighs pulled by attendants. They rarely gave much trouble in entering. When in the water they were scrubbed all over with soap and hot water, the men employed jumping on the camels' backs. When this operation was completed the camel walked up the opposite slope and was scraped down.

During the winter months great care had to be taken to choose only suitable days for washing in order to prevent the camels from catching cold after coming out of the bath. Washing in cold weather was only done in the mornings after the sun was up, so as to allow plenty of time for the animals to dry before night, but in the summer it could be carried out at any hour.

Disposal of Camels.

Hospital cases unfit for further military service were disposed of by the following means :—

(1) Sale.

(2) Slaughter for food.

(3) Destroyed and the carcasses condemned.

1. *Sale*.—Many camels which were unfit for further service in the army, or whose treatment would have taken too long on economic grounds, were nevertheless fit for sale to the civil population. Some of these were kept by their purchasers for work, but the great majority were bought by dealers who sold them to butchers in the villages, where the price of meat was often higher than in the immediate vicinity of the hospitals.

At No. 1 Hospital 5,645 camels were sold, of which 1,732 were sold in 1916 by order of the D.V.S. for other than veterinary reasons,

chiefly on account of being too young for work. This was before the creation of camel remount depots; after their formation only unsound camels were disposed of by the veterinary hospitals. On demobilization, all sales of serviceable animals were organized and carried out by the camel remount service. For a short time the sales from No. 1 Hospital were conducted by an auctioneer on commission, but at a later stage, owing to numerous complaints by purchasers regarding irregularities, all camels were sold in the hospital itself by the O.C., thereby saving the commission. Large crowds of dealers and butchers attended these sales and bidding was very keen, the prices varying from £E.5 or £E.6 in 1916 to as much as £E.64 in 1918, as minimum and maximum prices. As this was the base hospital and also situated in the Cairo area, more camels were sold here than elsewhere. In fact, one of the chief reasons for keeping the hospital in this district was the high prices to be obtained at these sales and also for camel meat. All camels sold were branded with a special hospital cast brand.

2. *Slaughter for Food.*—Camel flesh being of commercial value in Egypt, there was always a sale for the meat. A large number of the animals which were unfit for work, and which it was considered inadvisable to sell alive, were slaughtered and their carcasses sold for meat. In the hospitals up the line the meat was chiefly used for feeding the native civilians employed with the army. This was greatly relished by the men, as the meat was of good quality and vastly superior to what most of them were accustomed to in their own villages. In these hospitals all of the best camels suffering from trypanosomiasis, together with many lame and otherwise unsuitable animals, went to provide this meat. It was issued to the A.S.C., who indented daily on the hospitals for the quantities required. The system served two purposes: firstly, the getting rid of superfluous inefficient camels, and secondly greatly assisting the A.S.C. in its supply of meat.

At No. 1 Hospital, most of the camels slaughtered were sold by auction, though a few were also issued to the A.S.C. A certain number of camels were killed every morning, and a large number of butchers attended daily. All camels killed were carefully examined by a veterinary officer and, if found fit, the carcasses were put up to auction. Arrangements were made with the Egyptian Government Veterinary Service to stamp the camel meat with an official stamp so that it could be taken away without fear of arrest by the civil police. Butchers buying carcasses paid the usual slaughtering fees of the abattoirs, as laid down by the Government, and the amounts so obtained were handed over weekly to the proper authorities.

Large sums of money were obtained from these sales, and the demand for meat often exceeded the available supply. As the price of camel meat was often greater in the outlying villages than in Cairo, a much higher price was obtained for live camels to be killed outside than for those slaughtered in the hospital. In order to

obtain the highest value, many camels cast for slaughter were sold alive, as sometimes an enhanced price of as much as £E.10 per head was obtained by this method. To ensure the camels considered unfit for work by the veterinary service being really killed and not put to work, special marks or numbers were branded on the necks; also notes were taken of each camel, and a deposit was required from the purchaser. A piece of skin, showing the special mark, had to be produced to the O.C. within a specified time; if this could not be produced the deposit would be forfeited and the defaulter would not be allowed to attend further sales. This system worked admirably, and only in one case was any difficulty experienced in getting the skin returned. As much as £E.42 was obtained for a few camels for meat in 1918 and 1919, though in 1916, in some instances, camels fetched only £E.2 or £E.3 each. The prices obtained included the skins and the offal.

In the case of meat issued to the A.S.C., the skins, offal, and any pieces of meat surplus to the indent, were put up to auction, and the value of the meat issued was credited to the hospital account.

3. *Camels Destroyed and Carcasses Condemned.*—At No. 1 Hospital, 891 camels, when killed, proved to be unfit for human consumption. In some cases these camels were killed with a view to sale, but when, on post-mortem examination, they were found to be unfit for food, the carcasses were destroyed, and the skins, as in the cases of all camels dying, were sold by contract. All unfit carcasses were taken away by a contractor to be utilized for artificial manure, or, if unfit even for this purpose, they were buried.

The following figures give some idea as to the personnel employed compared with the number of camels dealt with at No. 1 Camel Hospital. The figures show the average number from its formation until its disbandment, over a period of 1,261 days :—

Total camels admitted	.. .. .	24,618
Total camel rations issued	.. .. .	1,391,121
Daily average number of camels	.. .. .	1,103·2
Daily average number of British officers, including the O.C. and the Q.M...	.. .. .	2·4
Daily average of Egyptian veterinary officers	.. .. .	4·2
Daily average of British O.Rs. on the hospital establishment	.. .. .	17·2
Daily average of British O.Rs. attached	.. .. .	5·3
Daily average of native camel clippers	.. .. .	17·7
Daily average of native dressers	.. .. .	14·8
Daily average of natives other than above, including raices and saices	.. .. .	408·1

The following table shows the results of all cases dealt with in No. 1 Hospital and the money realized by the sales. It will be noted that the average prices paid for camels sold alive or as meat has not been worked out separately but included under one amount. The price worked out to the average of £E.13 307 m/ms. per head all round.

No. 1 Camel Hospital.—General Statistics.

	No. of Camels.	Percentage of total.	Amount realized.	Remarks.
Admitted from 10/2/16 to 24/7/19 ..	24,618	per cent.		
Cured and discharged ..	14,265	58	£E.17,289	{ Cured or sold in sound condition, 65 per cent. Average price, £E.9 982 m/ms.
Sold for other than veterinary reasons ..	1,732	7	100 m/ms.	
Cast and sold in hospital ..	3,913	15.8	} £E.85,582	Average price, £E.13 307 m/ms.
Slaughtered and sold for food ..	2,418	9.8	800 m/ms.	
Slaughtered for Army Service Corps and offal sold ..	618	2.5	£E.2,997	800 m/ms.
Destroyed and condemned ..	891	3.6		
Died ..	729	3		
Remaining and handed over to No. 20 Veterinary Hospital ..	52	.3		
		100.0		

Total sales £E.116,521 380 m/ms.

Money taken in hospital £E. 88,580 600 m/ms.

£E. (Egyptian) = £ sterling 20s. 6d.

The Hospitals as Base Depots.

No. 1 Camel Hospital served as a base depot for the Egyptian veterinary officers attached to the A.V.C., and for all the British other ranks of the corps employed in camel units. All such personnel discharged from hospital arriving back from leave, or who were for the moment supernumerary to establishment, were posted here for temporary duty until they could be returned to their original units or posted elsewhere.

No. 2 Hospital was likewise the base for all Egyptian personnel employed in camel hospitals. It served as a collecting and equipping station for all natives enlisted for this service before they were drafted to the hospitals requiring them. In a similar manner, all native personnel who were time-expired, or going on leave, passed through this hospital before being returned to their homes. This did not apply to men of No. 1 Hospital, who, as stated previously, were enlisted locally.

Courses of Instruction in the Hospitals.

British N.C.Os. and men who were selected for duty with camel units were first posted to either No. 1 or No. 2 Camel Hospital. At these centres they received instruction in camel duties for at least a month before being sent elsewhere. They attended a course of lectures given by the commanding officers in camel management and the special duties required of them, and acted as dressers in the wards, so as to become practically as well as theoretically acquainted with the work. These courses were arranged as often as necessary whenever a sufficient number of men were drafted in.

The officer commanding No. 1 Hospital, having been lent for duty by the Egyptian Government, in whose service he was Principal of the School of Veterinary Medicine, Cairo, and Professor of Veterinary Medicine and Contagious Diseases, was permitted to continue his lectures on this subject to the final year students of the school. These students attended regularly at this hospital during the school session, and acted as dressers in the wards. As already mentioned, those students who obtained their diplomas during the war were for the most part given temporary appointments in the A.V.C. Thus they were able to commence their official duties with a considerable experience with camels, and had a most valuable and unique opportunity as students of obtaining a knowledge of camel diseases which is not likely to occur again. In return they were a great acquisition to the hospital, their services as dressers being given gratis.

Types of Camels.

Before this chapter is concluded a short account of the different types of camels treated in the hospitals may be of interest. It does not fall within the scope of this report to deal with their working capacities, but rather to mention their chief characteristics in so far as these relate to unsoundness and diseases.

All camels used were of the one-humped species, no two-humped camels being employed.

The description given is of a very general nature ; naturally many camels were not true to type and not always specially branded ; consequently it was sometimes difficult if not impossible to classify them correctly.

Breeds of Camels Used.

Egyptian.

Lower Egyptian.	Baggage, mostly heavy.
Lower Egyptian.	Mostly light baggage, a few riding.
Maghrabi.	Baggage, mostly heavy.

Sudanese.

Kababish.	Baggage, mostly heavy, a few riding.
Kowahla	Baggage, heavy.
El Shoukranieh.	Baggage, mostly light.
El Zebedieh.	Baggage, light.
Bishareen.	Riding, of which there were many varieties.

Somaliland Camels. Baggage, light.

Imported from Algeria.

Algerian.	Baggage, light.
Tunisian.	Baggage, light.
Moroccan.	Baggage, light.

Arabian and Heggazi

<i>Camels.</i>	Both riding and light baggage.
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Indian.

<i>Barge Plains Camels.</i>	Baggage, heavy.
Bikanir.	Riding.

Egyptian Camels.

(a) *Camels from the Delta or Lower Egypt.*—The Delta of Egypt is not a camel-breeding country to any appreciable extent, and most of the camels purchased in this region had been imported there for work. These chiefly came from Upper Egypt, where they are bred, but only the larger and better kinds are sent north where, owing to the nature of the ground and the food given, they attain a larger size than those remaining in Upper Egypt. Others came from Syria, many of which are very large animals, and some are bred locally. The camels found in the Delta north of Cairo may be described as large, well built, powerful animals, often assuming huge proportions and great weight. The largest may measure as much as 6 ft. 6 or 7 ins. to the withers and up to 7 ft. 7 ins. to the top of the hump, and the bone below the knee may reach a diameter of 10 inches. The colour is grey, sand-coloured, or brown, and the hair is of medium length and somewhat coarse. The head is large, the jaws are powerful, and the neck is long and very strong. The ribs are as a rule well “sprung,” and the back is short compared with the legs, which are rather long in some cases. The hump is large and high, and the sternal pad is well shaped and usually large. In temperament they are apt to be vicious and prone to bite, and

when rutting are liable to be dangerous. They require a great deal of food and are accustomed to frequent waterings.

They were found to suffer from most of the diseases met with, but none to any remarkable extent. Sore backs gave a good deal of trouble, especially injuries to the loins and lumbosacral region. Filariasis was rather common, and tuberculosis occurred amongst them occasionally. Speaking generally, they were a very hardy type of camel.

(b) *Upper Egyptian Camels*.—Camels purchased in Upper Egypt were, as a rule, of lighter build than the last-named, many having a mixture of Sudanese blood. The type varied a good deal, some approaching those of the Delta, to which they are akin, while others took after the Sudanese. These camels tend to be flat-ribbed and "leggy," are apt to be short of bone and to become debilitated with hard work. They are certainly not so hardy as the Delta camel, and many were found to suffer from filariasis and trypanosomiasis. There were no other special conditions noted, though lung diseases seemed rather common. Many of the cow camels used in the force were brought from Egypt. These were very good animals and appeared to be more hardy than the males. This might, however, be accounted for by the fact that fewer, and probably only the pick, of them were bought, and that the work given to them in the campaign was not so hard as that given to the males.

(c) *The Maghrabi Camels*.—These camels come from the western deserts of Egypt and from Tripoli, though many are also bred in Egypt proper. They were probably the best type of baggage camel used in the campaign. They are baggage camels of the heavy class, though not up to such heavy weight as the so-called Delta camel. In colour they are brown, many with a slightly reddish tinge, and many have dark points. The hair is very long and shaggy, but fine in texture. The head is very pretty, broad and full over the temporal region, well set, but not carried so high as in some other breeds. The neck is powerful and muscular, but not very long. The ribs are exceptionally well "sprung," giving a round barrel shape, but the back is apt to be a little long in some compared with the length of the legs, which are short but with very good bone. The hump is well developed, rather long but not especially high, and the pads are broad but not very prominent, though of good and durable type. The thighs are exceptionally powerful and well developed, and the pelvis is broad. In temperament they were found to be very tractable and good-tempered except when rutting, when they were apt to become very vicious and dangerous. They were the hardiest of camels, standing fatigue and abnormal conditions well. They suffered less from cold than any other breed of camels.

They did not become debilitated easily, but appeared to be rather liable to tuberculosis. Chronic sprain of the flexor metatarsi muscles was often noted in the hind limbs, and this was occasionally seen in other breeds. These camels seemed more liable to blindness than any other kinds, and amaurosis was often met with.

Sudanese Camels.

To describe Sudanese camels correctly under one heading is very difficult. There are numerous different breeds with many characteristics in common. Both baggagers and riding camels are bred in the Sudan.

Baggage Camels.—There are at least four different kinds, ranging from the large Kababish camels to the much smaller Zebedieh breed. The Kababish camels are very large animals; they measure more than the average Delta camel in height, but as a rule they are not so broad. The ribs tend to be flat, but in good specimens there is a very good deep barrel. The legs are long, but many have very good bone measurement. The colour is usually sandy or white, though some are dark brown, others black and a few piebald. The coat is short and the hair coarse. The head is large, nose narrow and Roman, eyes prominent, lips large, and the neck is very long, so that the head is held high. The sternal pads are as a rule well formed and prominent, being large and flat on the under surface and, when sound, of very tough and durable consistency. The hump is large and as a rule well developed. In disposition they are very good, never bite, but some are liable to kick out with their fore legs. They did not often rut, which was a great advantage.

The Anafi camel is a type of the last named, but more used for riding purposes. It is a much lighter camel, long and "leggy," with a tendency to be weedy. The head is small, fine, ears pricked, face narrow, giving it the appearance of the head of a giraffe. The hair is as a rule softer in texture than in the large baggage variety. These camels are very nervous and difficult to handle.

The Zebedieh breed is very small and light in build, and not nearly so useful as the Kababish.

The Bishareen Camel.—This is the best and finest breed of riding camel to be found in Africa. The best specimens are a veritable picture of what a camel should be. In appearance very well bred; head small and fine; ears erect and well set on; eyes large and neck well developed and strong. The neck is set higher up on the trunk than in other breeds, giving a large appearance of chest beneath it. The colour is sandy, grey, or white, the last named colour being the most prized. The skin is soft, supple, and thin when the camel is in good health, and the hair short and fine. The body is compact and the ribs well "sprung," the hump is centrally placed, and the bone is good for the size of the camel. The pads are usually very good and prominent. The camels are very intelligent and quiet in temperament, though when rutting, which, however, is not very frequent, they become very objectionable.

Diseases and Disabilities of Sudanese Camels taken as a whole.—Many of them took a long time to become acclimatized, and the second class camels, especially those of the large breeds, never justified their inclusion in the force. Nevertheless, the really good ones made excellent baggage camels. They were liable to be "let

down " badly behind, and sickle-shaped hocks were very common. The smaller riding varieties showed a tendency to have narrow pads slanting forwards to a point, and this was the source of much trouble from bruising. In the larger camels the pads were good as a rule, but there was a tendency to "elbow brushing" and the development of fibrous tumours of the pads due to this cause.

These camels did not stand cold at all well; lung troubles such as pneumonia and lung abscesses were common, and debility was very frequent. In cold weather diarrhoea and peritonitis were frequent troubles. Tuberculosis was practically unknown. All cases of actinomycosis met with occurred in Sudanese camels. The lung lesions of actinomycosis appear to the naked eye very like those of tuberculosis and may easily be mistaken for them without microscopic or bacteriological examination. Trypanosomiasis was frequent and often of a very acute type. In old camels, especially of the Bishareen breed, in-growing eye-lashes were very common.

Somaliland Camels.—These were chiefly small baggage animals measuring at most 6 ft. 9 in. to the top of the hump. They were used as light baggage camels. The colour is sandy with a slight reddish tinge, though a few are dark brown. The skin is soft and pliable with fine short hair. The best of them are pretty camels, head well set on, small but rather broad. The withers are low, flat and square, the humps well developed but often set rather far back and may become excessively large in fat camels. The ribs in some are well "sprung," but many are very flat-ribbed; the pads are low but exceptionally sound, only a very few sore pads being encountered. These camels were good tempered, never biting or kicking, though they were very noisy when handled. They were very slow in movement, walking with a slow, stilty stride. About 60 per cent. of the camels purchased were castrated.

Diseases and Disabilities.—The chief ailment they suffered from was polyarthritis, which was very common: the noise they made when "barraked" and loaded up was chiefly due to fear of having to get up and carry a load when they knew that every movement would be accompanied by pain. Lung troubles were very rare, tuberculosis was never seen, but enteritis and peritonitis were very common, many camels dying from these in the winter time. Trypanosomiasis was not often diagnosed, though oedematous swellings were sometimes noticed about the extremities, occurring and disappearing suddenly. No class of camel showed less "heart" than these, and when called upon for the smallest effort they were liable to collapse and put up no fight to recover.

Algerian Camels.—Under this term were classified together all camels imported from Algeria, though they comprised Algerians proper and Tunisian and Moroccan camels. They were all light baggers.

Those actually from Algeria are dark-coloured camels with long

soft hair and fine skins. They much resemble the Maghrabi camels, but were distinctly inferior and not up to nearly so much weight. The head is elongated and narrow, the jaw very liable to be coarse, and nearly all the camels had ears cut or split in half. The neck was long and the head held high. A few were short-legged, but the tendency is for them to be flat-ribbed, "leggy" and deficient in bone. When walking they are apt to have a very loose inco-ordinate action. The hump is often poorly developed with a tendency to hang down on one side, and some camels are "roach-backed."

Tunisian Camels.—Only a very few of these were used, and only a small number were admitted into hospital. They resembled the Maghrabi more closely than did the Algerian, but were much better than the latter. The prevailing colour was dark, though a few were white. They appeared to be very good camels.

Moroccan Camels.—Very similar to the Algerians but much inferior. They were very "leggy," very wild and unmanageable.

Practically all of these camels imported from Algeria were castrated, and all these had three small firing marks surrounded by white hair, one on the loose skin on each side of the flanks and a third central round the sheath. These were probably made at the time of castration, and were characteristic recognition marks.

Diseases and Disabilities of the above three types.—They tended to be wild, and many were admitted to hospital with injuries or fractures of the skull due to their unmanageable natures. Many were "calf-kneed" or had very straight hocks, and the feet were usually very large. A few on the other hand were "let down" too far back. The ribs were often flat, but the pads good on the whole. They were sometimes concave instead of convex or flat, but sore pads were very rare, though some camels had big bellies which projected below the level of the pads causing a thickening of the skin posterior to the pad due to bruising when "barraking" on the ground. Old camels were very liable to have ankylosis of the spine, making "barraking" painful and difficult, reminding one of the symptoms seen in polyarthritis. It was remarked that the incisor teeth were often very much worn for the age of the camel.

Lung diseases, including tuberculosis, were common, and many of the older camels had cirrhotic livers. Trypanosomiasis was fairly common. A peculiar stringhalt-like action of the fore legs was sometimes seen, due to chronic sprain of the extensor metacarpi magnus muscle. This was not seen in other camels.

The Arabian and Heggazi Camels.—Only a few of these camels came under notice at the hospitals. They were small camels of well-bred appearance, dark brown or grey in colour, heads well carried, ribs well "sprung," and of a good and healthy type. Some were capable of being ridden, while others were light baggagers. No special peculiarities were noticed about this breed, but the few seen gave a very favourable impression.

Indian Camels.—There were two distinct types at least brought to Egypt and used in the Egyptian Expeditionary Force :—

(a) The large heavy baggage camels. These might measure up to seven feet at the withers. They were enormous camels, probably bigger and more massive than any other breed in the force. The prevailing colour is brown ; head enormous with huge lips, the lower one pendulous ; nose slightly Roman though not so markedly so as in the Sudanese ; eyes small, ears coarse and not very well set on, tending to droop. The body was broad, ribs well “ sprung,” the hump well made and of only medium size in proportion to the frames of the camels. They had good bone and walked with a fast pace and swinging stride. The pads were, as a rule, good but were frequently affected with fibrous tumours, and “ elbow bruising ” was common.

(b) Riding camels. Most, and also the best, of these were of the Bikanir breed. They were much larger than the riding camels found in Egypt or the Sudan. The prevailing colour was brown, sandy, or mouse-coloured. The head was well set on, ears fine and erect, temporal region full, eyes bright and large, and the nose somewhat “ dished.” The body was well formed, ribs wide, and the hump well developed. The hair was rather long and fine. They were a very fast and fine type of camel.

Diseases and Disabilities.—Some were very flat-ribbed with a poor chest, the hump at times being badly formed ; when once debilitated, these camels did not pick up at all well. Amongst the riding camels was a condition known to the Indians as “ Kumri.” This showed itself in a difficulty in “ barraking ” ; when made to do this, the camel cried out with fear and pain. It was said to be due to nervous influences, but all those examined which showed the condition badly were found to have erosions or ulcerations on the articular surfaces of the stifle joints. Indian camels appeared to be almost free from tuberculosis. Rutting, when once begun, lasted for a very long time and was very troublesome.

CHAPTER XXVII.

CONVALESCENT HORSE DEPOTS.

IN the chapter of this history which deals with the work of the A.V.S. in France, there is a brief account of the first convalescent horse depot established during the war. The account describes how the original scheme of accommodating 4,000 horses on 3,000 acres of grass-land at Gournay-en-Bray had to be abandoned at the approach of winter in consequence of the disappearance of the grass and the severe cutting up of the pasture. It is shown that during the winter months it was necessary to bring the animals under cover and to reduce the number in the depot to 1,200.

The convalescent horse depots which were afterwards formed in France and in other theatres of war were established on the system of open sheds and kraals. The accommodation was usually for 1,200 animals.

Convalescent horse depots for 1,200 animals each were formed on the northern lines of communication in France, and care was taken to select sites where the soil was sandy and there were natural facilities for drainage. The object was to avoid mud.

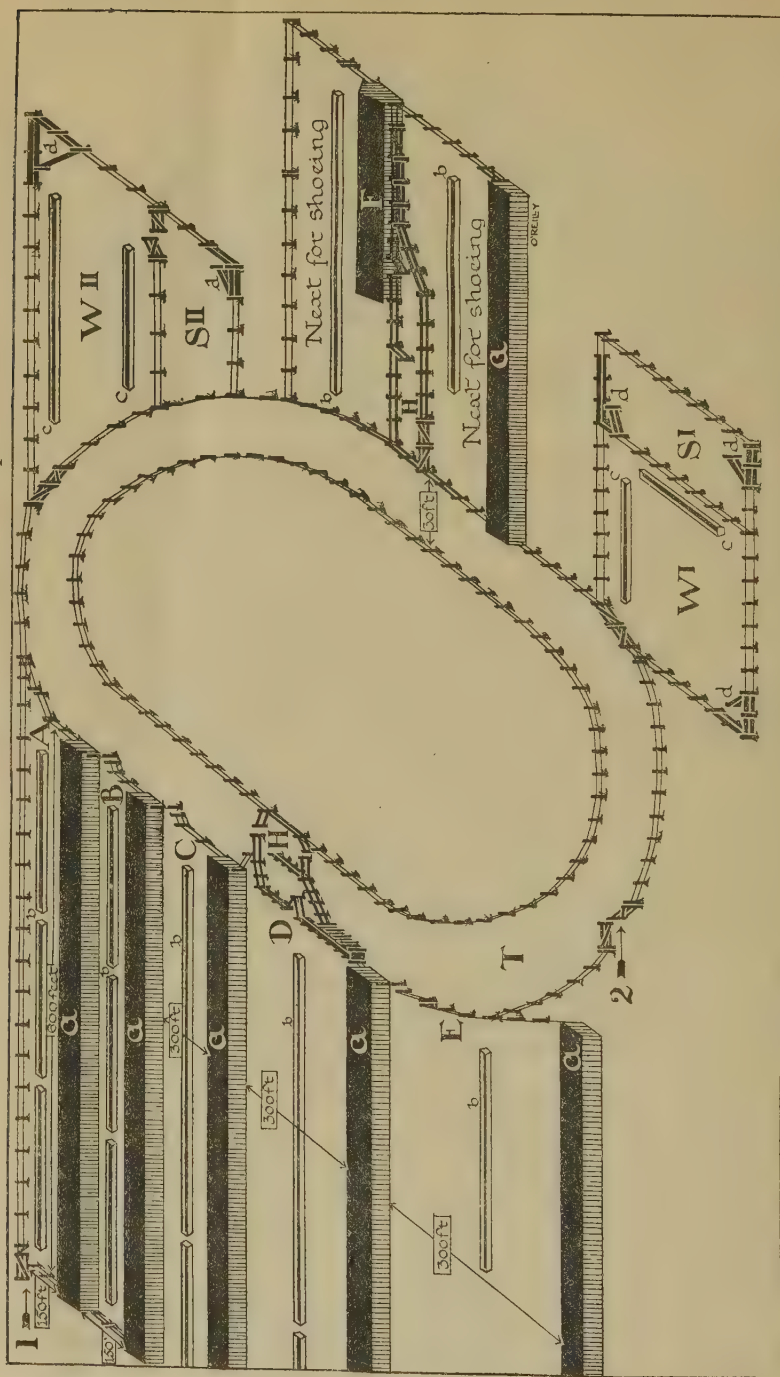
Each depot had an establishment of three officers (including a quartermaster) and 128 other ranks (including fourteen A.S.C. drivers).

Plan.—All the depots were laid out on the same broad principles, although there were some variations in the different units, due to the natural contours of the ground and other factors. These essentials comprised a series of well fenced kraals sheltered by open sheds, with facilities for inspection, exercise, watering and feeding.

The best lay-out was probably at No. 2 Convalescent Horse Depot at Dannes. This depot was made up of three blocks distinct from one another and each surrounded by its own exercising track. A road running down the middle of the block gave access to forage. On this road were placed the manure pits, and on each side of it four well fenced kraals were constructed. Each kraal could hold fifty horses; open stabling, complete with mangers and concrete or wooden floors to accommodate that number of animals, was erected on two sides of it. Each kraal had an area approximately of fifty yards by forty yards; consequently there was ample space for the horses to roam at liberty during the day; the sandy soil provided ideal resting places for the tired ones. Water was laid on to each enclosure and the supply was abundant.

The kraals all opened at one end into the central road and at the other end into the exercising track. This arrangement facilitated the work of carting forage, manure, etc., and also of exercising.

A Veterinary Convalescent Horse Depot.



REFERENCE.

A, B, C, D, E.—Kraals.
H.—Sorting crushes.
S, I and II.—Shunting yards.

T.—Exercise track (½ mile around).
W, I and II.—Yards with water troughs.

REFERENCE.

a.—Open shelters.
b.—Feeding troughs.
c.—Water troughs.

d.—Palisaded corners (for catching animals marked down as lame, etc.).
1.—Way for carts.
2.—Entrance to track.

Class of Case transferred to Convalescent Horse Depots.

Officers commanding veterinary hospitals were responsible for selecting the cases for transfer to convalescent horse depots, and they clearly understood that the depots were to be looked upon simply as resting places for debilitated and tired out horses. On no account was any animal suffering from contagious disease or any other condition which required veterinary treatment to be sent to a depot.

The horses as a rule were transferred to a depot in batches of from 50 to 200 at a time, and the treatment cards from the veterinary hospitals accompanied them.

Working.—For purposes of working, the three blocks (designated A, B and C) were kept quite distinct, and a due proportion of the personnel was allotted to each.

Block C.—This was used for reception purposes. On arrival of a batch of horses, each was carefully examined in order to ensure that he was a proper subject for admission, in fulfilment of the above-mentioned conditions. Those rejected on account of any cause which disqualified them from admission to a convalescent horse depot were returned whence they came. The description on the card and the number on the head-collar were verified and entered in the depot record book. The hind shoes were removed and the animals were allotted to a kraal, or kraals, which had been vacated and prepared for occupation by cleaning and disinfection. During the first fourteen days a careful look out was kept for the appearance of any contagious disease. In the day time, unless the weather was unsuitable, the animals ran loose in their kraals. They had free access to water, and were fed four times a day. After a few days' rest they were given quiet exercise on the track. With this treatment the majority rapidly improved so that at the end of the period of observation most of them were fit to move on to Block B.

Block B.—In this block the animals, as far as possible, were graded according to their condition. By this grading it was possible to regulate the amount of exercise in proportion to the strength of the patient, and thus to give the weaker ones a better chance. A constant watch was kept for contagious disease or for the occurrence of any condition needing more than slight treatment; such cases were immediately picked out and transferred to the adjacent veterinary hospital. Twice a week each batch was sorted, and the best were picked out for transfer to Block A.

Block A.—In this block, whose use was that of a discharge lines, the patients were shod and given increased exercise and grooming. They were carefully graded according to their condition, and once or twice weekly a batch was picked out for discharge. These were malleined and inspected by the C.O. before transfer.

Interior Economy and Accounts.

The system of accounting for animals, forage, rations, clothing, equipment and other stores was the same as that in a veterinary hospital.

Duties.—In a depot for 1,200 patients, with only two technical officers, it is evident that decentralization and delegation of responsibility to N.C.Os. must enter largely into the arrangements made for the care and well-being of the animals. Consequently it was found necessary to include in the standing orders of the depots in France detailed instructions for the guidance of the subordinate personnel who were responsible for the more important duties. As these instructions embody much actual experience of the difficulties met with in the working of a convalescent horse depot, as well as being of historical interest, they are reproduced here as follows :—

“ *N.C.Os. i/c Kraals.*—The main object of a convalescent horse depot is the building up of animals not actually suffering from disease, but from debility induced by illness, overwork, want of attention from unavoidable causes, and derangements of the digestive system from irregularities of watering and feeding. Suitable and systematic arrangements for watering and feeding and their careful supervision become therefore the chief factors in the management of a convalescent horse depot.

“ *Feeding and Watering.*—Experience has shown that certain classes of food are specially suited to the digestion of horses we deal with, and whilst the veterinary officer determines the nature of the food best suited to these animals, the beneficial effect of it will be to a great extent lost if the method of administration is not carefully observed. The method of administration devolves principally on the N.C.Os., and constitutes the most important part of their duties. It calls for careful observation and constant attention to what to many might appear to be unnecessary and unimportant details, but which play a most important part in the horse management.

“ The quantity of food allowed is regulated by the classes of animal, and administration is carried out economically by feeding each class, as far as possible, separately. But this separation in itself is not sufficient to ensure the best results. Classes should therefore be re-divided into groups, and it is on the “group feeding” that the N.C.O. should centre his attention. Horses, like human beings, are *inconstant feeders*, and for this purpose may be divided into three groups : (a) gross feeders ; (b) moderate feeders ; (c) shy feeders ; and it is principally the latter class which requires to be discovered and protected from the former. Horses become accustomed to feeding in appointed places, and in a kraal where a number of troughs is in use it is advisable to set apart certain troughs and encourage shy feeders to take their food in a place where it is possible for them to take their time and be away from the annoyance of gross feeders. Shy feeding is frequently caused by defects of the teeth, and these animals should be brought to the notice of the dressing staff for examination and attention. The presence of unmasticated food in the troughs is indicative of this. Feeding troughs should be kept clean, and all accumulations of food and

mucus should be regularly removed. The use of strong disinfectants for cleansing troughs (especially wooden ones) should be avoided as the smell "clings" to them and puts a horse off his feed. Water troughs require special attention as an accumulation of undigested food soon takes place at the bottom of the trough. Saliva and mucus also are deposited on the surface of the water and the edges of the trough. Upturned nails, tins, and irregular surfaces that may cause injury to an animal's mouth or nostrils should be at once attended to. A plentiful supply of water is very essential, and N.C.Os. should make a special point of seeing that, before 'dismiss' from stables, the water-troughs are filled, and that water-taps are not left running.

"*General.*—Loose fencing-posts and sagging wires should be corrected at once, and the practice of hanging articles on the wires, or of climbing through the strands, should be checked. It all tends to weaken the fence. Timber of every description should be preserved from injury by the application of tar and wire. At the commencement of each stable hour the N.C.O. should count his animals and see that they are correct, and any discrepancy should be at once accounted for. He should ascertain that the depot number is fixed in position in the head-stall, and any animal with a lost number should be verified from the horse book in the office before the number is replaced. He will keep a roll of horses, and will be personally responsible that a correct account is kept of all movements in and out of his kraal. He will render a state every evening showing the movements during the day and the number of horses under his charge. He will verify this number by an actual count, and not by book balance.

"*Prevention of Disease.*—While every care is taken to prevent the direct introduction of disease to a depot by careful examination of incoming animals by veterinary officers, it must not be forgotten that this precaution alone is by no means sufficient. Wherever horses are congregated in numbers one must be on the look out for disease conditions, and on the principle that "prevention is better than cure," N.C.Os. will, by careful observation, be constantly on the search for any slight suspicion that may enable them to detect disease conditions in their early stage, and check their spread. Catarrh and skin diseases are probably the most insidious diseases to be dealt with, and must be detected in their early stages to be properly controlled.

"In the case of catarrh, it is not enough to look for the presence of a nasal discharge, because by the time the horse has reached the stage of a "dirty nose" the damage has been done and he has probably infected the other horses. The early stage of catarrh is invariably associated with constitutional disturbances, which are manifested by an altered condition of the usual habits of the infected animal; therefore, any horse showing an inclination to listlessness, or a disinclination to feed with its usual alacrity, should be watched. The water and feeding troughs provide useful means of detecting

catarrh, and the presence of an unusual quantity of mucus should ensure the examination of all the horses in the kraal.

“Early detection applies equally, and perhaps more so, to mange, inasmuch as the parasite may be deposited on any wooden portion of the kraal with which the horse comes in contact, and these places become centres of infection to other horses. There is the added nuisance of itchy horses constantly loosening the kraal posts by rubbing against them.

“Lameness, however slight, should never be overlooked. Horses are constantly receiving kicks and bruises, and it is a dangerous practice to assume that a horse observed to be lame is only temporarily so on account of being lightly kicked by another animal. A serious attempt should be made to determine whether there is anything else to account for it.

“Treads from overcrowding at feeding troughs, and over-reaches from galloping, should be constantly looked for on the coronets and heels. Injuries to the hips are frequent causes of lameness. It is due in many cases to overcrowding at gateways. N.C.Os. should impress on their men the necessity for exercising much care in conducting horses into and out of the kraal. The tendency when leading more than one horse is to turn too sharply at the gateway; consequently a section of horses should be well clear of the gateway before turning in any direction, otherwise the inside animal comes in contact with the post, and an injured hip is often the result. Horses should be taken through gateways at a slow walk and never allowed to get out of hand and rush.

“The hind shoes of horses are removed before they are placed in the kraal. Cast front shoes should be carefully looked for. They become buried in the sand, and the clip of upturned nails proves a source of danger.

“Ragged and broken hoofs should be looked for and attended to. The unshod hind hoof is constantly breaking away, and unless attended to by a farrier is a frequent source of lameness and disfigurement of the foot. The shod fore feet become long, and the shoes require removing and the feet shortening. Ragged nail “clinches” should receive special attention, as they occasion lacerated wounds of the fetlocks and coronets. “Thrush” of the frogs should not be neglected and the hoof pick must be made use of to examine a frog properly. The smell of a “thrushy” foot is characteristic, and should assist detection.

“*Care of Kraals.*—The life of a kraal depends almost entirely on the ability of the N.C.O. in charge, and the care which he exercises to remedy defects in time. Unless special attention is paid to this a kraal soon becomes fouled. This fouling is mainly due to manure accumulating and being trodden into the sub-soil and mixed with urine, thus converting an otherwise sandy soil into mud. The drainage of sandy soil is mainly by soakage; therefore every possible effort should be made to prevent the accumulation of excreta on the ground. Dung should be constantly picked or raked up into

baskets. It will often be found that certain parts of the kraal are inclined to hold more moisture than others. These should, if necessary, be dug up, when it may be found that there is a clay pocket, which should be filled up with fresh sand. The vicinity of the water-trough requires to be specially watched. Horses constantly congregate there, and the overflow and drippings form a sloppy place near the edge of the concrete. A good plan is to line this edge with bundles of fascines covered with sand ; this enables the water to drain away."

CHAPTER XXVIII.

MOBILE VETERINARY SECTIONS.

AN account of the development and organization of mobile veterinary sections is given in the chapter dealing with the work of the Army Veterinary Services in France. That which follows here is concerned only with the actual working of the unit in the field.

Movements.

The O.C., M.V.S., as a rule received his operation orders directly from the headquarters of the formation to which his unit belonged.

It was sometimes found necessary to require mobile veterinary sections to adhere to a fixed march table; this made it impossible for them to carry out the work of collecting abandoned animals. It was found most desirable, when the military situation permitted, that a M.V.S. should be the last mounted unit to move, and that it should be given ample time to make a final evacuation of sick animals before proceeding to a new area.

Accommodation.

Billets and camps were arranged for as laid down in Field Service Regulations, Part I. A billeting representative from the mobile veterinary section was sent on in advance, and the best possible results were obtained only when the D.A.D.V.S. of the division interested himself in the allotment of billets with a view to securing suitable accommodation for the unit.

Experience showed that when formations were relieving one another in the line, arrangements should be made for the incoming M.V.S. to take over the billets vacated by the similar unit of the division that was being relieved. When this policy was assured, each section, during its tenure of a site, worked with a view to improving it and rendering it more and more suitable for the purpose for which it was required.

Inter-communication.

Nothing was more important than to make it easy for parties with sick horses to find the billet or camp of a mobile veterinary section. The measures taken to effect this included the display of a distinguishing flag at the site of the unit and finger-boards (at night, lanterns) at cross roads.

Arrangements were made with the O.C. divisional signal company or squadron for the delivery of messages and documents by despatch riders; and wherever possible the mobile veterinary section was connected with the divisional headquarters by field telephone.

Changes of location were at once reported to the O.C. signal company and the D.A.D.V.S. in order that the latter might notify the executive veterinary officers. This information was also published in divisional routine orders.

It is impossible to lay too much stress on these points, as failure to comply with them often led to parties with sick horses wandering over the countryside for days in search of the mobile veterinary section of their formation.

Disposal of Carcasses.

The provision of fatigue parties for burying dead animals at times made a big demand on the personnel of a M.V.S., and whenever possible the A.P.M. was asked to provide field-punishment men for this purpose.

In some army areas, notably the first, arrangements could often be made to dispose of suitable cases by sale for butchery.

Hides, as far as possible, were removed, salted, and sent to the reception hospitals for disposal.

Admission of Sick Animals.

Except in urgent cases, animals were not admitted unless accompanied by a certificate from a veterinary officer. Towards the end of the campaign, A.F.W.3732 was generally employed for that purpose.

A head-collar and head-rope, together with one day's forage, were required with each animal admitted.

Executive veterinary officers were responsible for seeing that cases were dressed and, as far as possible, made clean by grooming before they were sent to a mobile veterinary section.

Animals sent for admission remained on the strength of their units until they were evacuated from a divisional area. When this had been done, the O.C., M.V.S., was responsible for notifying the O.C. unit and veterinary officer concerned.

The O.C., M.V.S., was required to inspect carefully each case on admission and to check both the description and diagnosis. The business of deciding which animals were to be evacuated forthwith, and which were suitable for retention, was properly that of the D.A.D.V.S.

Evacuations.

These were carried out as often as necessary. During periods of stationary warfare a bi-weekly evacuation of thirty-two animals was convenient and, as a rule, met requirements; but the numbers, of course, varied widely according to circumstances.

When time permitted, a demand for the number of trucks required was sent to the R.T.O. twenty-four hours before evacuation. An indent for forage for the animals and rations for the conducting party was at the same time sent to the railhead supply officer.

A.F.W.3384 was completed for every convoy of sick, each animal being given a serial number. Care was necessary in this matter. One of the distinctive labels described in "Veterinary Manual (War) 1915" was prepared for each animal and either plaited low down into the hairs of the tail or rolled up and placed under the tongue of the poll-strap of the collar. Identification was made still

easier by the stencilling of the number of the mobile veterinary section on the off-side of the rump and the serial number, referred to above, on the near side in a corresponding position.

The pro-forma referred to in the "Veterinary Manual (War) 1915," Appendix 3, was also prepared in duplicate and given to the N.C.O. i/c conducting party together with A.F.W.3384 for transmission to the O.C. receiving hospital.

Surgical cases were dressed before despatch, and the dressings were as far as possible re-adjusted and, if necessary, renewed after entrainment.

The N.C.O. i/c conducting party was provided with a farrier's wallet for use in case of emergency on the journey.

Mange cases were dressed with a solution of calcium sulphide, led to railhead at a distance from the main convoy, and in charge of a separate man, and loaded into a separate truck. The O.C. mobile veterinary section saw that a label marked "to be disinfected" was attached to this truck by the railway authorities in order that necessary action might be taken at the end of the journey. The work of disinfecting railway trucks was carried out by personnel detailed by the reception hospital.

Allotment of Duties.

In such a small unit as a mobile veterinary section from which men are constantly being detached for varying periods it is impossible to adhere to any definite allotment of duties. The aim of the C.O. was to train his men in such a way that they were capable of carrying out, with reasonable efficiency, any one of the several duties required of them. It was necessary that every man, no matter in what capacity he was ordinarily employed, should at least be capable of rendering useful first-aid assistance to a sick or injured animal. The following, however, will give a general idea of how the work was distributed :—

Staff-serjeant. General supervision; discipline; issuing of receipts for animals admitted; office duties. Took all watering orders and supervised feeding.

Senior Serjeant. In charge of section riding horses and transport. Acted as Q.M.S. and visited ration and ordnance dumps daily to draw supplies.

Junior Serjeant. In charge of sick lines.

Corporals. Took charge of conducting parties alternately and, when not employed on this duty, collected all ambulance cases. Hence they had to know how to read a map.

Shoeing-smith. Inspected the feet of all animals, whether section or sick lines, at daybreak. This work of looking for loose shoes and rising clinches is as important as the actual shoeing.

A small field forge was obtained for him to work at when possible, and divisional commanders were usually willing to authorise the issue or purchase of these articles. Failing this, it was often possible to hire a forge in the locality.

Privates.

Expert dresser ..	1	Forage man ..	1
Cook	1	Clerk	1
Cook's mate and		*Loader	1
sanitary orderly..	1	General duties ..	11

As many as possible of the general duty men were trained in the following duties :—

- (a) Clipping.
- (b) Use of the blow-lamp and the disinfection of stables.
- (c) Preparing a carcass for post-mortem examination.
- (d) Flaying a carcass and salting the hide.

It was found desirable to make every man responsible for the care of his riding horse, saddlery and rifle, and not to pool these and give them over to the custody of three or four men as was sometimes done.

Finally, there was much that had to be done by the commanding officer in person. He held a parade daily at 9 a.m., when rifles, respirators, etc., could be conveniently inspected and extracts read out from orders. If he wished to get the most out of his men, he found much to occupy his time in matters of clothing, feeding, paying, housing and general comfort of the personnel under his command. In the performance of his technical duties he had to be ever on the alert to correct hasty and erroneous diagnosis on the part of executive veterinary officers. As he was dealing with far smaller numbers of animals than they were, he was able to devote more time to individual cases so that greater accuracy in diagnosis might reasonably be expected of him. He was, moreover, provided with a microscope. It was necessary for him to bear in mind the fact that, as he was entirely engaged in dealing with the non-effective animals of a division, it was all the more likely that among them might be found incipient cases of contagious disease. He might, for example, discover a case of glanders which had escaped detection by the executive veterinary officer concerned owing possibly to conditions in the forward area which so often were in the highest degree unfavourable to accurate diagnosis.

To O.C..... Mobile Veterinary Section. Army Form W.3732.

Please admit the following animal :

Unit.....	Corps or Division.....
Class	Colour and sex.....
Age	Height.....
Body Marks	
Foot Marks	
Disease	
Remarks.....	
Date.....	Veterinary Officer.

* This man was permanently attached to the divisional train as a loader for the supply wagon.

ARMY VETERINARY SERVICE.
Roll of Horses Evacuated for Veterinary Reasons

No.	Class.	Colour.	Sex.	Height.	Age.	Distinguishing Body Marks, including Brands.	Foot Marks.	Reasons for Evacuation.	Unit.
.....
.....
.....
.....

.....O.C.

Date.....

.....Mobile Veterinary Section.....Division.

CHAPTER XXIX.

TRANSPORTATION OF ANIMALS.*

(1) *Care of Remounts on Board Ship.*

ARRANGEMENTS for the care of remounts on cross-channel journeys were made by the Army Remount Department. All other technical arrangements for the care of horses and mules on board ship were made by the Army Veterinary Service with the assistance of the Admiralty, the Director of Movements and the Remount Department.

In September, 1914, as soon as it was decided to send remounts from Canada, arrangements were made for the engagement of a civil veterinary practitioner and a lay assistant for each ship, and their despatch to Montreal. The veterinary practitioner nominated his own assistant. The former was engaged on the form of contract included in Admiralty Transport Regulations. His pay was £250 a year, with a bonus on a sliding scale dependent on the percentage of animals landed in satisfactory condition. At first the scale was as follows :—

2s.	per head if losses did not exceed 1 per cent.	
1s. 6d.	" " " "	2 "
1s.	" " " "	3 "
6d.	" " " "	5 "
3d.	" " " "	10 "

Nil if losses exceeded 10 per cent.

Later in the war when, by reason of improvement in policy and detail, the rate of mortality was greatly reduced, the scale was amended to the following :—

2s.	per head if losses did not exceed 1 per cent.	
1s. 6d.	" " " "	2 "
1s.	" " " "	3 "

Nil if losses exceeded 3 per cent.

The assistant received a flat rate of 10s. a day.

Settlement of the bonus was arranged for as follows :—

- (a) The authorities at the port of embarkation provided a certificate stating the number of animals put on board.
- (b) The veterinary representative at the port of arrival provided a certificate stating the number landed in satisfactory condition.

The veterinary department of the War Office furnished a certificate, based on the two former ones, to the Command Paymaster, Eastern Command, authorizing payment.

Many questions arose concerning the amount of bonus payable. Conducting officers claimed that, when losses were due to storm or other causes beyond their control, these losses should not be counted against them for purposes of bonus. At first, concessions were

* See also pages 723–742.

made in this respect, but ultimately it became so difficult to determine to what extent losses were beyond human control that the hard and fast rule was adopted of adhering literally to the terms of the contract, except in instances of loss by enemy submarine attack. In these circumstances a certificate was obtained from the master of the ship concerned, stating the losses that had occurred up to the time of the enemy attack.

It is believed that the system of payment by results in the form of the bonus was a sound economical measure.

The initial policy of allotting a veterinary practitioner and an assistant to each ship was found to be impracticable. The duties of a conducting officer on board ship are of a rough and ready sort, and the adequate performance of them depends largely on an exceptional capacity for horsemastership and control of men. In too many cases the veterinary practitioner was inclined to confine his activities to professional attendance on the sick and injured, and to disregard that detailed supervision of the welfare of *all* the animals which is necessary to prevent sickness and mortality amongst animals on board ship.

As a rule, only a young man could successfully tackle the work. When, therefore, the younger and more able among the civil practitioners employed on horse-ship duty elected to accept temporary commissions for general service, for which they were urgently needed, it was found that a change of policy must be made. American veterinary practitioners in some numbers were, it is true, available, and were frequently appointed by the authorities overseas, but, with a few exceptions, they did not make good conducting officers; those employed were, as a rule, too academic and relied too much upon vaccines and sera instead of applying their energies to the homely tasks of preventive medicine. This was also true of some of the British practitioners.

The plan, therefore, was tried tentatively at first of appointing as conducting officers a few of the men who had gained experience as assistants, and had shown themselves to be able and zealous in the matter of general supervision. It soon became evident that where this supervision was given, whether by the veterinary practitioner or by the assistant, the results obtained were very much better than where animals only received professional attendance when sick, however skilled that professional attendance might be. The measure, in short, was such a success that it was continued as a general policy, with the result that, at the end of the war, only a few veterinary practitioners remained.

Early in 1916 it became evident that, when remounts were conveyed by sea in the charge of military personnel, the best results could not be obtained by civilian conducting officers, because soldiers would not willingly carry out their necessary orders. Accordingly, sanction was obtained to offer honorary temporary commissions as Lieutenants, A.V.C., to a limited number of suitable civilian conducting officers. Seven gentlemen were duly selected for these

appointments and were gazetted accordingly. The appointments were fully justified during the extensive movement of animals, under entirely military conditions, from the United Kingdom and France to Egypt and Salonika in 1917-18. In the intervals between voyages these military conducting officers were employed in veterinary hospitals to assist in conditioning the animals that were cured of their diseases, and were awaiting discharge to remount depots; this relieved the strain on veterinary officers at a time of high pressure.

The engagement of conducting officers was often a step in the dark, and it was found necessary to judge their efficiency entirely by results, and to be ruthless in dismissing a man who incurred abnormal losses unless there was indisputable evidence to show that the losses were beyond his control. By this means a highly efficient body of men of all sorts and conditions was collected.

A total of 257 civilian conducting officers was appointed during the war, and there are records of more than 200 ships being used for the conveyance of remounts.

On two ships (S.S. "Cambrian" and S.S. "Etonian"), the Masters* were appointed as their own conducting officers and received the bonuses, though not the pay. Both these Masters had great experience prior to the war in the sea-conveyance of animals on transatlantic routes and knew how to pick their foremen. Their results were remarkable, and it was a matter of regret when the increase in the enemy's submarine activity made it necessary for them to resign this duty and confine their energies to navigation. Much valuable information was obtained from these officers, and it was largely through their representations that the principle of carrying remounts in separate stalls was abandoned.

The chief routes of conveyance of remounts were :—

- (a) Montreal to Liverpool, Avonmouth (except during the winter months when the St. Lawrence was frozen), and Mediterranean ports.
- (b) Newport News, Portland, Boston, and New York to the same ports in the United Kingdom, and to Mediterranean ports.
- (c) Mules only from New Orleans to the United Kingdom and Mediterranean ports.
- (d) Horses and mules from Buenos Ayres to the United Kingdom.

Occasional shipments were landed in Ireland, Thames ports, Glasgow, Hull, and French ports.

The total losses among remounts from all causes (excepting enemy submarine attack) on all ocean routes throughout the entire war barely exceeded 1 per cent. of over 600,000 animals. In the later stages of the war, ship after ship arrived with no loss whatever, or only one or two deaths out of cargoes of 800 to 1,200 animals.

The chief features of the policy which produced these results were :—

- (a) The rule that no unhealthy or freshly purchased animals should be shipped.

* Captains Gardner and Wood.

- (b) The above-mentioned ruthless weeding-out of all but first-rate conducting officers.
- (c) The adoption of the principle of carrying animals loose in pens instead of tied up in single stalls.
- (d) The rule that all conducting officers arriving in the United Kingdom should report in person at the War Office in order that their views and experiences might be completely ascertained and, if necessary, acted upon.
- (e) The improvement effected in the ventilation of the horse-decks by the greatly increased use of electric fans and new types of wind sails.

Every attempt was made to secure the adequate cleansing and disinfection of ships between voyages. As far as possible arrangements were made for conducting officers to return on their empty ships in order to supervise the work of disinfection ; but it became more and more difficult to arrange this as time went on, owing to the frequency with which the ships were diverted to other routes for other purposes. The best method of cleansing and disinfection was that of scrubbing with hot caustic soda solution, which mechanically removes the dirt and debris that harbour parasitic and bacterial life.

In the earlier stages of shipping operations sufficient care was not taken at the ports of embarkation to ensure that animals in the early stages of strangles and pneumonia should not be put on board, with the result that losses from these diseases were often heavy. There was a loss of over 10 per cent. from respiratory disease on one ship during the winter of 1914-1915.

Reports of conducting officers appeared to show that there was, to some extent, a disagreement of policy between the veterinary practitioners on the ships and the remount embarkation authorities overseas in the matter of what constituted unfitness for shipment. Losses became so frequent and so considerable on ships arriving from Montreal in 1915, that arrangements were made for a high administrative officer of the army veterinary service to proceed to Canada to inspect and report upon the veterinary aspect of the British Remount Commission. The effect of this mission was to obtain the firm co-operation of the remount authorities in the principle of shipping only healthy or " salted " animals and in the details, (including temperature-taking, as far as practicable), necessary for ascertaining the existence of disease. It is interesting to note that the British were alone in accepting this principle. The French and Italian authorities held that it was less costly to ship animals as soon as they were bought and let them take their chance of living, than to provide the necessary accommodation and labour for their being conditioned and " salted " prior to shipment.

It is likely that this difference of opinion between ourselves and the allies was due to the circumstance that their purchases were so much less than ours and did not extend continuously over a long period. Their losses at sea and after landing were considerably

greater than ours. Some of the losses on Italian remount ships were truly appalling.

The principle of carrying animals in pens instead of in single stalls was gradually introduced, and carefully observed, before general arrangements were made to adopt the measure.

At the end of the war the fitting of ships with pens to hold four horses became an Admiralty regulation for all remount ships. Five per cent. of single stalls were retained for the accommodation of vicious animals. It was fully proved that animals in pens stood up better in heavy weather and landed in fitter condition than those carried in stalls ; and moreover, to fit the ships with pens was less expensive.

In October, 1914, the scale of forage laid down in Admiralty regulations was :—

Oats	..	..	..	..	..	3 to 4 lb.
Bran	..	..	..	..	..	5 to 6 lb.
Hay	..	..	..	..	..	.. 12 lb.

This was changed in 1915 to :—

Oats	..	..	..	..	..	3 lb.
Bran	..	..	..	..	..	5 lb.
Hay	..	..	..	..	..	16 lb.

and finally changed in 1916 to :—

Oats	..	..	..	..	..	2 lb.
Bran	..	..	..	..	..	3 lb.
Hay	..	..	..	..	..	16 lb.

with 2 lb. additional hay for horses of the artillery type.

It was found that the last scale was best suited for the requirements of remounts. It should be noted, however, that the actual amounts fed to healthy animals on board often exceeded the daily ration. There were always several animals who were off their feed and, in addition to the daily amounts for each horse laid down for a voyage of an estimated duration, the regulations allowed 20 per cent. extra for emergency. The scale was a practical one which always met the full requirements of the voyage, but it must not be taken as a guide to the amounts actually consumed. In exceptional circumstances, as when horses were shipped from Canada on open deck in the depth of winter, extra grain was provided.

Excluding losses by drowning due to enemy submarine attack, the chief causes of mortality on board ship were (in order of importance), pneumonia, surgical injuries (including those due to storm), and strangles.

Pneumonia caused few losses after the first twelve months ; and losses from rough weather, though they occurred each winter, were seldom heavy. In fact, only on three occasions were losses from heavy weather disastrous. On one of these occasions 150 animals were killed, incurably injured or drowned. It was impossible, owing to the breaking of heavy seas, for two days to open the hatches of the horse-decks.

In the later stages of the war, in order to utilise more fully the carrying capacity of ships, it occasionally happened that only the top decks were used for horses, the holds being filled with grain, etc. The animals benefited on the whole by being in the open air, but instances occurred of some being washed overboard or killed by collapse of the super-structures in rough weather.

In very hot weather it was found that animals in the hold or on decks below the sea level, which were to some extent kept cool by the surrounding water, fared better than those carried on between-decks above the level of the sea.

The numbers of animals carried on each ship varied from less than one hundred, when only the top deck was utilised for this cargo, to more than fifteen hundred when the entire carrying capacity of a large ship was filled with mules.

It seldom happened that more than one thousand horses were carried on a ship.

*Losses by enemy submarine activity were less than might be supposed owing to the inclusion of the horse-ships, on the homeward journey, in convoys. There were naturally many narrow escapes.

One instance may be given of the keen spirit which animated our conducting officers. The S.S. "Anglo Californian" was heavily shelled off the coast of Ireland; much damage was caused, and several of the animals on board were killed and wounded. In consequence of the damage to the ship and the likelihood of its sinking, it was considered advisable to send off most of the crew (including the horse-keepers) in the ship's boats, and the conducting officer (Mr. F. D. Neal), a civil veterinary practitioner, was invited to leave with them. He preferred, however, to remain on board to do his best to look after the wounded animals, which were ultimately brought safely to port. The circumstance was reported to the War Office by the Admiralty, who suggested that he should receive a special reward for his action. The War Office agreed, and Mr. Neal received a gold watch with an appropriate inscription.

The equipping of remount ships with veterinary instruments and drugs was at first carried out on a somewhat lavish scale, but it was ultimately found that actual requirements were fairly met by the issue of an officer's wallet and a veterinary unit chest, with some additional tincture of iodine and surgical dressings.

A good deal of money was spent in providing practitioners engaged in Canada and America with many sorts of proprietary sera and vaccines.

Chloride of lime was found useful in dealing with the excess of ammonia vapour on the lower horse-decks. Disinfectants and soda for cleansing purposes were provided under Admiralty regulations.

When it is considered how expert the conducting officers became, and how faithfully they carried out their duties in the most difficult circumstances, it seems invidious to make distinctions. It ought to be stated, however, in a history of veterinary services, that the

* The total losses at sea by enemy action were 5,589 animals.

conducting officer who proved to be most constructive and inventive in his work was a civil veterinary practitioner.* Apart from his practical efforts which gave him, throughout nearly four years of continuous service, an average loss of less than one per cent., he was able to record his experiences in the form of a description of the methods and fittings which should be used on ships carrying horses. He also prepared a detailed account of the duties of the foreman who was necessarily placed in charge of civil subordinate personnel on remount ships. These are the only records which remain of the careful detail which became the normal routine during the war, a routine which only reached relative perfection after many mistakes and experiments had been made. See Appendix C. II and III.

Reference has been made to the fact that specialist conducting officers did duty on ships where military instead of civil subordinate personnel was employed for horsekeeping work. The matter arose in this way. When, in the later stages of the war, large bodies of mounted troops and remounts were being sent as reinforcements from England to Mediterranean theatres of war, it was thought expedient to utilise highly trained conducting officers for the ships instead of appointing officers, A.V.C., with temporary commissions who had no former experience of this sort of duty, although the latter might be available and be proceeding on the same ships.

Similarly, on special occasions, when large bodies of mounted troops were despatched from France to other theatres of war, specialist conducting officers were sent to Marseilles for this duty.

(2) Care of Animals on the Strength of Mounted Units on board ship.

Except as stated above, purely military arrangements were made for this duty, officers A.V.C. being in veterinary charge. Results on the whole were good, though heavy losses were experienced in the movement of some of the units of the 2nd Mounted Division to Egypt at the beginning of the war. The greatest mortality of horses on board ship during the war occurred among the animals of the Australian Forces during the voyage to Egypt in 1915. Great heat was experienced in the Red Sea and Suez Canal; and this circumstance was aggravated by the fact that the animals were not all clipped before leaving Australia. The death rate was as high as 30 per cent. on some ships, and the average exceeded 12 per cent.

Subsequently it became the rule that all animals were to be clipped before being sent from temperate regions through the Red Sea, and that, as far as possible, the journey should not be made during the monsoon season.

(3) Transportation of Animals by Land.

Reference has been fully made in the chapter on diseases to the mortality that occurred in the early part of the war, through animals being put on rail in a state of high temperature, and to the measures of prevention which it was found necessary to introduce.

* Mr. A. E. Boyer, M.B.E., M.R.C.V.S.

Close attention had also to be given to the matter of the disinfection of railway trucks, as a quantity of evidence was collected to show that mange and ringworm were transmitted through the medium of railway trucks. The railway companies were informed, and as a result greater care was ultimately taken in the cleansing and disinfection of rolling stock used for the conveyance of animals.

Apart from these measures, it was not necessary to alter in any way the existing arrangements for land transportation of animals in Great Britain and the theatres of war.

The chapter of this history which describes the work of the A.V.S. with the British Remount Commission gives information of the experience gained on this subject in the conveyance of animals on exceptionally long railway journeys.

CHAPTER XXX.

EXTRACTS FROM WAR DIARIES.

THE war diaries furnished by officers in the earlier days of the war contained many references to difficulties that were subsequently overcome.

In military, as in other matters, however, history may repeat itself, and it is thought that an account of some of the difficulties mentioned in the diaries may serve a useful purpose.

In selecting the following extracts, an endeavour has been made to give typical examples of the widely different problems that were brought to notice in the diaries.

* * * * *

Arms for Mobile Veterinary Sections.

(*Diary of O.C. No. 9 Mobile Veterinary Section, France, 1914.*)

At 6.30 a.m. on September 10th, 1914, a French farmer came and said that five German soldiers were eating in a farm a little way along the road. No other British troops were near, so the section turned out with three rifles (these are the only three rifles in the section, viz., one each belonging to officer's batman and groom, and one to A.S.C. driver). Went to the farm and took the five Germans prisoners. They did not offer any resistance.

Within an hour the same farmer came along and said that fourteen more German soldiers were coming across the fields. Again turned out with three rifles. Luckily at that moment a transport wagon of the A.S.C. arrived and halted to repair the engine. Six men who were in the wagon had rifles. These were also turned out. We marched along the road and hid behind a wall, and as the Germans appeared we covered them with our rifles. They surrendered, probably thinking that there were many troops in the vicinity.

Although this happened well within the area of the advancing British and French troops, this incident appears to show the advisability of arming mobile veterinary sections on active service.

* * * * *

(*Diary of O.C. No. 11 Mobile Veterinary Section, France, September, 1914.*)

The section is armed with swords only, and a fire-arm is necessary in view of the close proximity of the enemy. A revolver would appear to be the most useful weapon; it would serve as a defence and as a means of destroying horses incapable or useless for further service, which individuals of the section are sent out to collect. A humane cattle-killer is not included in the equipment of a mobile veterinary section.

* * * * *

(*Diary of D.V.S., B.E.F., November, 1914.*)

Q.M.G. has approved of the issue of arms to mobile veterinary sections: serjeants to have revolvers, rank and file rifles. They

were badly needed, as the mobile veterinary sections often moved by themselves, and up to the present had only swords with which to defend themselves.

* * * * *

Veterinary Work on Gallipoli.

(*Diary of O.C. No. 18 Mobile Veterinary Section, Gallipoli, May, 1915.*)

During this time, on account of the shelling, it was found very difficult to carry out the dressing as the camp was in the centre of the area of shell fire. On several occasions horses that had been thrown for operations had to be got up hurriedly to enable the men to take cover in compliance with camp orders. Dust storms were frequent and caused considerable trouble, as they rendered the dressing difficult and made the wounds filthy. The dressers were at last compelled to wear gauze masks. Flies were an additional source of difficulty in the treatment of wounds.

One hundred horses were killed and wounded by shell fire on May 13th and 14th and this, with sickness, which was prevalent among the men, made the work excessive for those who were carrying on. The watering of the horses was not an easy matter. On many occasions no water was obtainable from the wells allotted to the section.

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(*Diary of A.D.V.S., 11th Division, Gallipoli, 1915.*)

Went over to see the horses of the 58th Brigade R.F.A., which are at 117 L. 5 concealed in a gully among the rocks. Lieutenant Simons, A.V.C., the veterinary officer in charge, met me and I found that here, also, a number of horses had been hit. The veterinary officer is treating the cases on the lines already indicated and only operating when necessary. He says he is very much hampered by lack of experienced dressers. There are two old farriers who understand this work, but as they are both good gun-layers they are constantly required in the firing line. The specially enlisted farriers can shoe horses, but have no knowledge of treating sick horses, and Lieutenant Simons is endeavouring to teach them. He is the third veterinary officer who has been in charge of this brigade since I have been A.D.V.S. of the XIth Division, and all have said the same thing. He has got the wounded horses in a place apart, affording the best cover in the locality, and is doing all the dressings himself. All the wounds are clean and looking fairly well.

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Mobile Veterinary Section as Caretaker of Spare Horses of Cavalry Brigade.

(*Diary of O.C. No. 1 Mobile Veterinary Section, France, November, 1914.*)

Received orders for the mobile veterinary section to assist in taking charge of all spare horses and remounts of the brigade, a total of over 600 horses.

All the regiments are now very short of men owing to casualties, and can only allow one man to look after six of these spare animals.

Proceeded to a farm half a mile outside . . . when I was requested by A.D.V.S. of the 1st Cavalry Division to take charge also of 609 spare horses of the Indian Cavalry Brigade. Captain Hodgins, A.V.C., and Lieutenant Pigion of the 4th Dragoon Guards were there to assist me, with one man to about six horses. Very short of picketing gear; not enough nosebags; and many loose horses with no means of securing them.

The section was now unable to carry out its normal duties because every man was required to assist in watering, feeding, and exercising the animals. Finally, owing to shortage of men, we had to work very hard to be able to water once daily, feed three times, and exercise. During this period the weather was most unfavourable for animals in the open. It was raining or freezing nearly the whole time.

The horses were ultimately distributed to units in the 1st Cavalry Division, and the section was again able to carry out its proper duties.

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Transport and Horse Ambulances for Mobile Veterinary Sections.
(Diary of O.C. No. 12 Mobile Veterinary Section, France, February, 1915.)

During the past month it has become more evident how greatly the mobility of a section is hindered by having no means of disposing of animals which are temporarily unable to walk. While the section remains in one place such cases can be treated for a week, or even longer, and be so much improved as to be able to walk to the station for sending to hospital. When, however, several of such cases are on hand and a move takes place, unless a section is very close to the station, they cannot be disposed of in this way with the present equipment of a mobile veterinary section. Speaking generally, the cases are those which require constant veterinary attention, especially in the earlier stages, and if left behind without this they will probably be useless when opportunity to collect occurs. The only alternative is to destroy them, and this seems unnecessarily wasteful and does not reflect credit on our organization. The situation described above would not occur at all if a light horse-float was in possession of the mobile veterinary section. Such cases could then be collected at once, attended to, and sent to the base hospitals immediately, when the section is moving from one point to another. The float could be used to carry forage and would be infinitely more useful for this purpose than the G.S. forage cart at present part of the section equipment.

It is possible that the above considerations do not apply with equal force to the mobile veterinary sections with cavalry brigades, but the experience of the last four months especially has forced the conclusion upon me that a float would be of immeasurable benefit to a mobile veterinary section with an infantry division. . . .

Once more I must record the difficulty of dealing with a percentage of horses without a float. The loss of horses in a division on account of there being no float with a mobile veterinary section must reach almost £300 a month.

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(Diary of O.C. No. 11 Mobile Veterinary Section, France, September, 1915.)

One forage cart, provided for transport of veterinary stores and section equipment, is absolutely inadequate, and second line transport is essential. When the section is marching independently, the want of a water-cart is greatly felt. The transport allowed for the mobile veterinary section gives rise to considerable difficulty. The G.S. limbered wagons are not large enough, as frequently a considerable amount of forage has to be carried for cases which have been sent to the section but which are not sufficiently serious to be evacuated, and which it is desirable to keep. I have applied to exchange one G.S. limbered wagon for one G.S. wagon. It would be a very great help if a light float could be issued to mobile veterinary sections in place of one wagon. This float could be used for moving horses or for transport purposes. If a float were provided I am certain a good many horses could be saved which with the present transport cannot be moved.

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(Diary of A.D.V.S., 8th Division, France, September, 1915.)

Division on the move. Several horses collected, by the aid of a borrowed float, that were unable to move at the last minute. Horses collected to-day by the float would otherwise have had to be billeted for some time, and in the end, perhaps, destroyed for lack of veterinary attention. I am more convinced every day that, if the mobile section was equipped with a float, more horses, and consequently more money, would be saved.

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(Diary of O.C., 41st Mobile Veterinary Section, France, March, 1918.)

Transport not working well owing to float, which delays movement of sections; it is absolutely unfit for transport work when marching over roads rendered difficult by bad weather and heavy traffic. The clearance of the body of the float in these circumstances is not sufficient, and it is constantly dragging on the road surface. It is a constant danger, as it is liable at any moment to become stuck and thus hold up all traffic. It cannot carry an ordinary load over broken ground, as it is a cumbersome and heavy vehicle. It is useful for what it is built for—that is, to carry sick horses, but as a transport wagon on bad roads it is useless.

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Transport for Veterinary Evacuating Stations.

Diary of A.D.V.S., 15th Corps, France, October, 1918.)

Great difficulty has been experienced in moving the veterinary evacuating station.

Lorries were promised but cancelled at the last moment, and arrangements had to be made to bring up the necessary equipment by rail, and this has happened on each occasion. If such arrangements could not have been made, the evacuation of animals would have seriously been interfered with. The motor ambulance has not yet arrived, so at present we are relying on an old float, which we salvaged and repaired, to convey float cases to railhead. All this makes the work very difficult and unnecessarily heavy. The O.C. and men of the veterinary evacuating station have worked hard and done well, and all evacuations have been carried out satisfactorily. . . .

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Evacuation of Casualties.

(Diary of A.D.V.S., 2nd Division, France, August 30th, 1914.)

Arrived Soissons at 7.45 a.m. after a very long and constant march. Horses beginning to feel the strain and getting very exhausted. They will not be able to stand much more of it. No. 3 Mobile Veterinary Section reported itself to me at 12.45. Doubt whether I shall be able to get any casualties together to evacuate, but see what is likely to happen to-morrow. If another retirement, then it is impossible. Again, I find that it takes considerable time to inform units it is intended to evacuate. They were often very widely billeted, and it is dark when they get into billets and dark when they start in the morning. In order to evacuate, twenty-four to forty-eight hours' previous notice is necessary.

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(Diary of D.D.V.S., B.E.F., France, September, 1914.)

On September 4th visited headquarters, 1st Division, and saw A.D.V.S. Discussed difficulty of evacuating sick during retreat. He had attempted to do so three times unsuccessfully; once when the train was required for wounded; once the station was blown up; and the third time they were too late. He said that time was insufficient, between receipt of information as to railhead and departure of empty train, to reach the place, as a rule. No. 2 Section (Mobile) with this division. Visited headquarters, 1st Army, discussed matters with A.Q.M.G. Agreed to use railhead when convenient, otherwise march as many as possible, and destroy those which cannot keep up.

September 6th. A very good day, swept up over 500 horses in all and despatched them. Reported Q.M.G.

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(Diary of O.C. No. 7 Mobile Veterinary Section, France, October, 1914.)

On line of march rode forward with the interpreter to Amiens, leaving my mobile section halted one mile back. Made arrangements for two trucks for my sick horses. Also arranged for their watering and feeding before retraining. Left interpreter at the station and

rode back to mobile section. Sent the sick horses with men in charge under a N.C.O. to entrain. Twenty-three horses were entrained. Wire sent to advance base veterinary hospital at Villeneuve St. Georges. A note given to oldest soldier, with special instructions regarding feeding, watering, securing, and general care en route. Also a letter was handed in person to O.C. Hospital. Instructions to interpreter and N.C.O. to rejoin as soon as they had seen the train off.

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(Diary of D.D.V.S., 2nd Army, France, May, 1915.)

The establishment of an advanced veterinary collecting station has, under certain conditions, answered very well, the patients being taken to the mobile veterinary section by short cross-country roads and tracks, thus avoiding congested roads, and put on rail next day. By this means close touch with units has been maintained.

The nearest supply railhead has been used by mobile veterinary sections in the area of active operations for entrainment, irrespective of whether it was the supply railhead of the division concerned. Sick horses have been assembled there, rested, watered and fed. Entrained at about 4 p.m., and railed straight away to the receiving veterinary hospital on the line of communication, at which they are due to arrive at 11 o'clock next morning.

The divisions held in general army reserve don't appear to be administered by any D.D.V.S.; the headquarters, I.G.C., are far away. I wrote to the D.V.S. suggesting that they should be administered by the D.D.V.S. of the army in whose area the division concerned happens to be located.

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(Diary of D.A.D.V.S., 18th Division, France, April, 1918.)

During a retirement of any length, the idea of the divisional mobile veterinary section acting as a veterinary evacuating station for the other divisions is not practicable, and I doubt whether a permanent veterinary evacuating station under these conditions would be of any use. It is absolutely essential for the divisional mobile veterinary section to keep with its division, and, owing to the constantly changing railroads, it is difficult to carry out the evacuation of sick animals. The mobile veterinary sections of each division in the corps managed to evacuate up to nearly the last trains leaving Noyons, but this was done individually and not through the corps, and the tentative site for the mobile veterinary section in the event of a retirement had to be evacuated very early in the course of operations. Fortunately, as regards my own division there was little need for evacuation of sick during the march. Whatever the organization may be, the evacuation of sick animals to the base during a retirement will always be a difficult problem, and those cases which cannot accompany the columns will undoubtedly have to be destroyed.

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(*Diary of D.D.V.S., Cavalry Corps, France, 1918.*)

Visited Nos. 7, 8 and 9 Mobile Veterinary Sections of the 2nd Cavalry Division, where I saw Nos. 1 and 39 Mobile Veterinary Sections, and finally No. 13 Mobile Veterinary Section of the 3rd Cavalry Division. All the sections had been much on the move lately and have done some long marches, and generally have had a busy time. Their work has been carried out satisfactorily and well, and at all times they have been kept mobile and ready to move owing to their being able to pass their casualties through veterinary evacuating stations to base veterinary hospitals. . . .

I find that latterly cavalry mobile veterinary sections generally are depending too much on corps veterinary evacuating stations for the evacuation of their casualties, even to the extent of sending them long distances rather than make their own arrangements and evacuate from a railhead much nearer to them. In normal circumstances I consider the sections should arrange to send down their own casualties from a railhead that may be near rather than send animals long distances by road to a veterinary evacuating station, and I have issued instructions accordingly to A.Ds.V.S. . . .

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Veterinary Administration in Battle.

(*Diary of A.D.V.S., 1st Division, France, September, 1915.*)

Provided some little care is taken by an A.D.V.S. in selecting a site, there can be no possible objection to an advanced collecting post being close up to wagon or gun-team lines. Any site well clear of batteries, railway stations, or high buildings, is as little likely to be shelled as one miles back. Any site with a clear run back to railhead, without touching main traffic routes, preventing evacuation, or in any way interfering with traffic, is suitable. Such a site is quite possible to find in almost every square mile of country, and it is seldom difficult to find a site with these advantages close to one's division. The advantages gained are very great. Shell wound cases can be evacuated at the earliest possible moment, which is of the utmost surgical importance. The advantage of relieving units without delay of numbers of useless horses is also beyond question; but unless a collecting station is near at hand this can only be done by turning the animals loose, because all buildings will be full of wounded men. Loose animals, particularly when wounded, increase the disorder and want of discipline on a battlefield, a fact that tends to depress troops and cause straggling. There appears during an action to be too much galloping; quite a number of individuals can be seen at all times galloping as if carrying important messages, yet from time to time they can pull up to talk to a friend or to watch the scene. Ammunition teams, also, in some instances travel long distances on hard ground at a fast gallop. After a few trips they are reduced to a walk and have to pull out a number of exhausted animals, having gained nothing and having done not a little to increase the general unsteadiness by their action.

It was very noticeable during the last action that galloping rarely took place in old army units.

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(*Diary of A.D.V.S., Corps, France, 1918.*)

Animals of this corps between August 22nd, 1918, and September 12th, 1918, viz. : three weeks.

Wounded by shell fire	..	..	..	786
Wounded by bombs	..	..	..	102
				<hr/> 888
Killed (or destruction necessitated) :				
By shell fire	..	..	..	276
By bombs	..	..	..	44
				<hr/> 320

Some of these casualties happened when the animals were working, but the majority occurred in the horse lines.

It should be remembered that the average value of a horse or mule is now between £90 and £100, and more trouble should be taken to camouflage lines. Very often horse lines are made right out in the open, and even if protected by anti-bomb traverses—which take a long time and a good deal of labour to make—they are very visible to enemy aircraft. Anti-bomb traverses are good, but not good enough. In any case they should be camouflaged.

The enemy makes much more use of the banks and dug-outs for his animals than we do. In fact, he takes infinitely more care of them in this respect.

Old trenches enlarged and then covered over make excellent protection for animals. These are easier to make than anti-bomb traverses, and are a much more effective protection. Dug-outs in banks—like gun-pits, and either roofed over or only camouflaged—are very valuable. Of course more labour is required for their construction than for trenches. Where there are lots of large shell holes, it is a good plan, in fine weather, to dig these out to enable each shell hole to hold two horses.

Camouflage. There is a large quantity of this in the corps area, but it is mostly unused by our troops for horse lines. I see horse lines all over the place near the camouflage, but very few animals under it. Most of it is wasted. I do not know the money value of camouflage material, nor the difficulties there may be in getting it, but I think it should be more extensively used in horse lines.

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Motor Cars for Administrative Veterinary Officers of Divisions.

(*Diary of A.D.V.S., 7th Division, France, March, 1915.*)

During the short period I have been with this division I have greatly felt the want of a motor-car for inspection purposes ; units being in some cases seven to eight miles apart, which makes

supervision very difficult, especially when there is any movement of troops going on.

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(*Diary of D.D.V.S., Indian Cavalry Corps, France, September, 1915.*)

Light cars only cost £150 and run over thirty miles to the gallon of petrol. There is much to supervise, and it is almost impossible to get round the large area covered by the divisions, especially when the cavalry corps is on the march. . . .

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(*Diary of A.D.V.S., 1st Division, France, September, 1915.*)

A light car is a necessity for an A.D.V.S. To-day's work again involved over forty miles on horseback, with the consequent loss of some four hours on the road. I should like to lay stress on the economic mistake of refusing to issue a light motor car to an A.D.V.S. of a division who has almost daily outbreaks of disease to deal with. The loss in efficiency and the cost of a comparatively small outbreak of mange would be less than the cost of a car and its upkeep. The issue of a car would very materially increase the powers of supervision of an A.D.V.S.

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Quarters of Veterinary Officers with Cavalry Brigades.

(*Diary of A.D.V.S., 2nd Indian Cavalry Division, France, May, 1915.*)

At a recent conference I brought up the subject of where the two brigade veterinary officers should live, and by whom their baggage and chest should be carried. The D.D.V.S. said this was entirely a brigade matter, and that he did not mind where they lived so long as they did their work. I advocated their living together near brigade headquarters and working the brigade together. It is thought that these two officers should, both for convenience in working the brigade and for simplicity in transport arrangements,* be with brigade headquarters as, although no official complaint has been made, veterinary officers have encountered difficulties in arranging for the carriage of their tent and chest. This matter requires a definite ruling. If they are brigade officers, they should be near brigade headquarters; if attached to units, their kit, etc., should be carried by the unit.

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Remounts for Divisions, France.†

(*Diary of D.D.V.S., B.E.F., France, September, 1914.*)

The condition and quality of the remounts compared very unfavourably with that of the horses in the field. Some of them

* In future campaigns some special provision should be made for the transport necessary for veterinary officers in charge of divisions, brigades and mounted units. The most useful and economical form of transport would appear to be a small motor-car which the officer or his batman could drive.

† This recalls very forcibly similar incidents which occurred in the South African War, and if those experiences had been recorded they would probably not have been repeated in this war.

were sick, discharging from the nostrils. Some were unshod behind and footsore; they had been several days on the march, and should reach their units to-morrow. The officer in charge was not at the camp. They had no picketing gear. . . .

Visited No. 5 Cavalry Brigade at Braisne; they had just got 90 remounts, of which 50 were of no use to them on account of lack of condition. They were leaving these. Wired A.D.V.S., 1st Division, to pick them up, and later heard that he had so arranged. . . .

The A.D.V.S., 3rd Division, was sent to Couloumières on September 10th for 307 remounts; it was said that no other officer was available. He was the only officer with the party and he alone possessed a saddle. The horses arrived in halters, many unshod behind, some unshod in front, and several others with shoes in a bad state. I met them to-day at Braisne. He has dropped 138, the great majority on account of being foot-sore, but a few had escaped in a stampede. Twenty-six of the footsore horses he had left as remounts with an A.S.C. unit, the rest at various places en route. These were good horses, but the arrangements at both ends of their journey courted disaster. . . .

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Shoeing.

(Diary of A.D.V.S., 4th Division, France, 1914.)

September 9th. Inspected 10th, 11th and 12th Field Ambulances and found the horses' feet in a very bad state as they were nowhere near the divisional train where they should be shod; consequently, as they had no shoeing-smith or tools, they were helpless. Arranged for the headquarters' and signal company's farriers and shoeing-smiths to shoe up all the horses they could. The veterinary officers of the infantry brigades reported that their shoeing was in a very bad state, and that the cold-shoers were quite unable to cope with the work; also there was a great scarcity of shoes and farriers' tools.

September 13th. Veterinary officer in charge of the 12th Infantry Brigade reports verbally many horses working without shoes, and that the cold-shoers were quite unable to carry out the work.

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(Diary of A.D.V.S., 2nd Cavalry Division, France, September, 1914.)

Rode to headquarters of 5th Cavalry Brigade, to go into question of horseshoes. Found that 300 sets had been indented for but not received. Went on to Lesges (20th Hussars had moved to the village on the 18th inst.) and saw Captain Jackson. He told me they had picked up some shoes and that the brigade horses were pretty well shod up to date. They had experienced, in common with the other units of the division, great difficulty in getting shoes of the right size. No. 4 is the size in greatest request. There are

no portable forges, but they make use of the village forges. Captain Jackson reported that some of the tools had been lost. This loss of tools might be very serious, and I would recommend that the bags be made with stronger bottoms or that two bags be used, one on each side.

I think that each mobile veterinary section should have one shoeing-smith allotted to it. These sections are almost always acting independently and ought to have some one capable of shoeing a horse.

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(Diary of A.D.V.S., 46th Division, France, 1915.)

On the whole the shoeing good and the farriers and shoeing-smiths are capable workmen. Difficulty has been sometimes experienced in altering and fitting shoes, especially those of heavy horses and the lighter horses which require special shoeing. These difficulties do not exist when the use of a civilian forge can be obtained ; but when no civilian forge is available, and when no field forge and anvil are on charge, the shoes, especially the heavy ones, cannot be altered, and the horses' feet suffer in consequence. . . .

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(Diary of D.V.S., Mediterranean Expeditionary Force, June, 1915.)

The 90th Heavy Battery complains of the excessive weight of the shoes, especially the hind ones. The going is soft, and heavy shoes are not required. Lighter shoes of the Egyptian pattern are required for all horses and mules of the expeditionary force.

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(Diary of A.D.V.S., 4th Division, France, August, 1915.)

Interviewed the D.D.O.S., 3rd Army, on August 24th, about the taps that were issued with frost cogs last winter. My contention was that these taps were not desirable or satisfactory as they always broke at the joint of the shank and handle. Suggested that in future they should be made in one piece without a joint. D.D.O.S. gave me sample taps of $\frac{3}{8}$ in. and $\frac{1}{2}$ in. to try. These were both jointed but better made than those issued last winter.

Intimated to A.A. & Q.M.G. on August 26th that the $\frac{3}{8}$ in. taps for frost cogs that had been given me by the D.D.O.S., 3rd Army, for a fair trial had become broken at the joint between the shank and the handle. Recommended that these taps should be made out of one piece of steel without a joint.

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Bruised Feet and Shoeing.

(Diary of A.D.V.S., Australian and New Zealand Mounted Division, Palestine, February, 1918.)

A. & N.Z. troops entered Jericho after experiencing severe opposition at various points. The weather being very cold and

showery, and the country very mountainous with narrow stony tracts and valleys, affected the horses greatly. The inclement weather caused them to lose condition, and the stony ground caused a great number of bruised feet as the animals had been used to sandy and soft country for some time. The country had the effect of causing a great many shoes to be broken and torn off ; consequently the animals were soon lame. It is recommended that each unit should carry sufficient leather for the purpose of relieving this condition when possible.

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Headropes.

(Diary of A.D.V.S., 14th Division, France, September, 1915.)

I find in my rounds that, with the present state of warfare, where horses seldom do a hard day's work and are picketed on lines in the open, collar chains are the most desirable form of head gear for tying up horses. Ropes and reims are eaten and, even if not, are very difficult to handle in wet weather.

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(Diary of A.D.V.S., 5th Division, France, October, 1915.)

In some units horses have developed a vice of chewing headropes and the raw hide thongs (or reims) which are used as headropes. This has led to a number of kicks owing to horses getting loose and wandering about the lines at night. Raw-hide thongs, soaked in a mixture of tar and cresol solution and then dried, are not so readily destroyed as the untreated raw-hide. Chains in lieu of headropes have been issued as far as possible (about 50 per cent.).

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Halters and Picketing Gear.

(Diary of A.D.V.S., Havre and Rouen, France, September, 1914.)

There has been great difficulty in getting line gear, such as ropes, head collars or halters. Horses arriving from England are shipped with flimsy halters which mostly break on the voyage, resulting in horses being brought to hospital with a short length of rope round the neck. . . .

Major Bartlett considers many casualties are due to faulty shipping arrangements, especially to horses being improperly secured on board ship, and considers casualties at the remount depot are occurring from the difficulty of getting any sort of line gear, and to the fact that there are very few men to look after the horses, and most of these few quite inexperienced. . . .

Visited docks and saw the commandant of remount base there. Only a flimsy halter was on horses being landed from a ship. This halter generally comes off ; at the best it can only be secured below because so many ships are fitted with one stanchion to two horses, the result being that the horses bite each other very badly. There

are many cases in hospital that have been so badly bitten that the skin has sloughed off a very large area on the side of the neck, leaving wounds that take many weeks to heal. . . .

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Watering Arrangements in the Field.

(Diary of A.D.V.S., 14th Division, France, June, 1915.)

Saw the best pattern dipping hole for drawing water out of a standing pool at which all our horses have to be watered. A square pit, about 3 ft. square, 3 ft. deep, and dug about 5 yds. from the pond, is connected with the pond by a trench about one foot wide into which are sunk two boxes with their sides knocked out and covered in with filtering cloth. Between the two boxes can be placed cinders, sand, or stones. The receiving pit, which must be boarded around the sides, has a hole left to receive the water from the connecting trench, the hole also being covered with sacking or other filtering substance. This makes a clean place from which to dip the water without fouling the pond.

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Stray Horses.

(Diary of D.V.S., B.E.F., France, December, 1914.)

We have records of a very large number of stray horses having been left behind on the line of march with farmers and other people, especially during the move of the divisions from the Aisne to the north. I am endeavouring to form a collecting party which will scour the country and collect horses, despatching them by train to the nearest veterinary hospital.

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Construction of Veterinary Hospitals, France.

(Diary of O.C., No. 5 Veterinary Hospital, Abbeville, April, 1915.)

There are still a number of works services which require doing. Arranged meeting with principal works officer and asked that they might be completed. The main things were : provision of shelving in ration store and kitchen ; laying on water to ablution place, and overhead shelter ; partitions in expense forage sheds to provide a place for stable utensils ; provision of an exercising track. These proposals were received with favour but, owing to shortage of labour, it is probable that we shall have to do them ourselves. I also asked that the open forage shed be boarded up to shelter the motor chaff-cutter now being installed. This was refused. Next day very wet ; rain beating into the shed in which the chaff-cutter is fixed interfered with the sparking of the engine, which consequently refused to work. Reported this to principal works officer, and asked him to come and see it ; he did so, and now realizes that it must be closed in.

Another wet day shows how necessary it is to have proper roads in a hospital. The roads we have made are excellent, but elsewhere the place is a quagmire. What would it be like in the winter after a month of continuous rain !

At present the standings are made of powdered earth and chalk, with two, three, or four sleepers at the back on which the horse is supposed to put his hind feet. Naturally he prefers to stand off them, and a hospital horse in one night makes his stall into a morass. The only use of the sleepers is to prevent drainage: one would be better without them as the horse urinates, then stands and puddles up the floor into a mush.

Saw Director of Works and showed him a few of the stables, from which he was able to appreciate the position.

I suggest that all stalls should be laid with sleepers, laid lengthwise. Said I would gladly provide the labour if he could give me the sleepers, which he promised to do.

At present the men are accommodated in huts (thirty men in each hut), in which they eat, sleep, smoke (and expectorate). This does not appear sanitary, and I am changing it. By putting thirty-six men in a hut (to sleep only) I can release three huts and turn them into dining and recreation rooms. Saw sanitary officer and obtained his consent. The three huts are to be furnished with tables, forms and cupboards to keep food in, and in the evenings are available for recreation purposes. Writing paper and ink, games and journals will be provided. By this means I hope to make the men more comfortable and offer some encouragement to those staying in camp.

Am having constructed an exercising trench in the N.W. corner of the hospital, 150 yds. round, 20 ft. wide, with rails 4 ft. 6 in. high. It is on the small side, but the site will not permit of its being made larger. Have to build up the ground a good deal at one end on account of the slope, but we have a good deal of surplus earth on hand.

The whole of the construction will have to be done by us as the R.E. have no workmen to spare. . . .

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(Diary of D.D.V.S., B.E.F., France, March, 1915.)

Inspected Indian Veterinary Hospital at Marseilles. Satisfactory. The buildings are made of planks, with roofs covered by papier carton. The stables are made with overlapping weather boards, and the other buildings with filleted boards and covered joints. They are not lined or covered with anything except the roofs. . . .

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(Diary of D.D.V.S., B.E.F., France, April, 1915.)

Saw base commandant at Boulogne and represented the needs of the veterinary hospitals on various points, good standings being one of the chief. In the past we have done the best we could to make standings, but they are now worn into holes and require replacing in a more skilful and permanent manner. Also represented the necessity for a better style of water trough, with concrete or other impervious surroundings.

Attended I.G.C.'s conference referring to new buildings for extension of veterinary hospitals. Instructions were given to D.W. that these were to be the cheapest possible class of shelter without bails. I remarked that the omission of bails would prove expensive because English horses constantly kick in stables, and the consequent inefficiency and fatalities would cost more than the provision of bails.

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(Diary of D.D.V.S., B.E.F., France, June, 1915.)

Took up question of water troughs now being built for No. 5 Veterinary Hospital. Arrangements satisfactory. Recommended one short trough for each stable instead of the few long ones contemplated. It is most essential that we should be able to isolate the animals in any particular stable.

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(Diary of D.D.V.S., B.E.F., France, August, 1915.)

Improvement of standings and surroundings general but slow. A wet day and, as the hospital is a clay brick-field, wet is always trying here (Neufchatel, Pas-de-Calais). Standings of chalk and shingle are being extensively laid down and are said to give fair results. Concrete surroundings are being placed to all water troughs, which will be an advantage. Paddocks are being constructed for turning horses loose in the day time. . . .

D.V.S. consulted me *re* provision for winter. My opinion is that stabling is necessary for all horses sent down sick. Proper treatment cannot be carried out without the conveniences of a hospital, and whatever number of sick is anticipated, that is the number for which hospital accommodation is required. As 30,000 is the estimated number, I advise that number of stalls to be provided.

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Lighting of Veterinary Hospitals, France.

(Diary of D.D.V.S., B.E.F., October, 1915.)

After dark, visited No. 5 Veterinary Hospital to ascertain what lighting is necessary for the winter. Acetylene lamps are suitable for the forge, dressing and operating sheds. Hurricane lamps are suggested for the stables, but 100 to 200 for each hospital will only just make light enough to feed by, and if any technical work is to be done something better is requisite.

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Horse Tents.

(Diary of O.C., No. 5 Veterinary Hospital, Abbeville, France, 1915.)

The new horse tents which recently arrived were pitched to-day, June 10th. It took twenty men two and a half hours to pitch one. They are good tents, but have no ridge ventilation; the walls

are made all in one piece instead of in separate bays ; the side poles are too weak and of poor quality. Each tent holds thirty-six horses. . . .

A moderate gale suddenly sprang up to-day (July 7th) and gave the new horse tents a test. They failed where expected, i.e. the side poles. Fifteen of these out of forty broke in five minutes. The sides of the tent collapsed, but fortunately no damage otherwise was done, though we had to remove the horses and strike the tents.

The poles were made of white deal, full of knots, and only 2 in. in diameter. They should be of red deal or ash, 3 to 3½ in. in diameter.

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Standings.

(*Diary of O.C., No. 9 Veterinary Hospital, France, December, 1914.*)

A suggestion of the D.V.S. that I use straw on top of the mud in my lines has been acted upon, with the happiest results. While the rest of the field remains a quagmire, the horses are standing almost dry shod. . . .

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(*Diary of D.D.V.S., Indian Cavalry Corps, France, 1915.*)

I inspected the remount depot at Marseilles. It is difficult to see how matters can be improved, but the 300 odd light horses of this depot are standing in deep mud on breast lines, closely packed to prevent kicking. With the deep mud and close packing combined no horse ever lies down.

In such circumstances it is best to tie horses to breast lines far enough apart to allow of their lying down, and to accumulate bedding under them by adding successive layers of straw without moving any, as much as possible being done to improve the surface drainage around the standings. . . .

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(*Diary of A.D.V.S., 4th Division, France, January, 1915.*)

Extracts from Routine Orders by G.O.C., 4th Division, dated January 18th, 1915, state that where horses cannot be provided with firm standings, such as the yards of certain farms or roads, specially allotted for the purpose, units will take immediate steps to put down brick standings for their horse-lines. It is recommended that bricks be laid on edge. Where possible bricks should be taken from demolished houses, otherwise they may be bought. . . .

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(*Diary of A.D.V.S., 1st Division, France, 1915.*)

The greatest difficulty to contend with at present is the disinclination of units to make any serious attempts to improve the temporary standings in case of bad weather, a difficulty chiefly created by the idea that they may be moved down soon and another unit

will benefit. It is surprising how rapidly lines become deep in mud after rain when no attempt has been made in fine weather to put down any sort of standings. . . .

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Identification of Horses in Hospital.

(Diary of D.V.S., B.E.F., France, January, 1915.)

The question of the identification of horses in hospital is a very important one which gives rise to a great deal of difficulty. With hospitals so large as they now are, it is quite easy for cases to be mixed and for no one to realize how long some of the patients have been under treatment. As a result, some of the cases go dragging on week after week, leading to useless expenditure of public money with little likelihood of the animals ever becoming fit for service again.

The system of branding on the feet is laborious, and where the horse lines are in the open, endless trouble is caused by the difficulty of reading the numbers. The system of clipping letters or figures on the quarters or other parts of the body has been tried without success, and the same applies to hair branding. Labels fastened on the head-collar seldom last more than a few days. A.D.V.S., Gournay, now recommends the system of identity discs made of metal (similar to those used for the men), stamped with a number and fastened with a strong cord to the hair of the tail. This is being tried. . . .

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Canvas Water Troughs.

(Diary of O.C., No. 13 Veterinary Hospital, France, July, 1915.)

The canvas troughs that have been in wear two months are now beginning to leak, due, I think, to their resting on the ground. New troughs have been erected but are now either suspended in the air or resting on platforms. This will, I hope, prevent the canvas rotting so quickly. These troughs, while they last, do excellent service, as they are easily cleaned and hold an ample supply of water for large numbers of horses. . . .

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Forage for Horses in Veterinary Hospitals and Convalescent Depots.

(Diary of D.V.S., B.E.F., France, January, 1915.)

The Director of Supplies raises the question as to whether full rations are necessary for "side" horses, including the convalescent depot, seeing that they are doing no work. Replying that the rations being drawn are 12 lb. oats and 12 lb. hay for light horses, and 15 lb. hay for heavy horses doing no work, as it was a matter of building up evacuated animals in inclement weather. To cut down rations for debilitated animals is false economy, as it means that they remain for a much longer time under treatment. . . .

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*Manure Disposal from Veterinary Hospitals, France.**(Diary of D.V.S., B.E.F., December, 1914.)*

The disposal of manure at the veterinary hospitals is a question of very great importance, and in certain places much difficulty is experienced in getting rid of it. Where hospitals are located in the country districts, farmers in most instances are glad to have it, but at Havre and Rouen there is nothing like the demand. The terrible weather we are having increases the difficulty of removal for two reasons :—

- (1) The amount of mud which becomes mixed with the manure.
- (2) The fact that the roads leading from the manure pits to the places where it is stacked are impassable during wet weather.

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(Diary of D.V.S., B.E.F., France, January, 1915.)

I.G.C. has now sanctioned the issue of four tip-carts to each hospital for the removal of manure. It will be conveyed from the hospital to a selected dumping ground, from which it will be carted by neighbouring farmers. Up to the present the hospitals have had to use the ordinary G.S. wagon, which is quite unsuitable for the purpose. . . .

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(Diary of O.C., No. 5 Veterinary Hospital, Abbeville, 1915.)

The manure question is a big one, but we are fortunately well circumstanced for getting rid of it. I have a dung-pit, roughly 9 ft. by 10 ft., for every two stables. The pits are of $2\frac{1}{2}$ in. beech planking, 3 ft. 6 in. high, closed in on three sides. Each pit will hold the manure of a day and a half.

We have three tip-carts of our own, but these are insufficient and have to be supplemented by other transport two or three days a week.

The average number of horses in this hospital is 750, and the amount of manure is from thirty-six to forty tip-carts a day.

Each cart at present does from eight to ten loads a day, depending upon the distance it has to be carted.

The farmers are willing to accept it provided we cart it for them and dump it on places selected by them. . . .

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(Diary of O.C., No. 13 Veterinary Hospital, France, July, 1915.)

The removal of manure takes a large number of men and horses for that duty only. We have about twenty loads a day, and this has to be incinerated or stacked and covered with soil according to the medical officer's instructions.

I consider the disposal of manure a very important point in the working of a veterinary hospital, and would suggest that each hospital be provided with a dumping ground where the enormous

quantities of manure can be placed. The place must be near the hospital (not more than one mile away), otherwise it is impossible to dispose of the manure with horse transport.

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Clipping.

(Diary of O.C., No. 6 Veterinary Hospital, France, 1915.)

Great delay has been caused by the inferior quality of the heads of the Stewart clipping machines. A requisition was sent for 100 heads to the Ordnance at Havre. This quantity may seem enormous, but a head will only clip two horses with thick matted coats. Sheep-shear heads are recommended.

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(Diary of O.C., No. 5 Veterinary Hospital, France, November, 1915.)

The D.V.S., on October 22nd, sent me four clippers (heads) of the Stewart sheep-shearing pattern. These have given excellent results with mange and ringworm cases. For ordinary clipping they are useless, as they leave the animals ridged and ragged looking; but for dirty, scurfy, matted coats they are ideal. One head clipped forty-nine horses before getting blunt. They are more rapid (can do a horse in less than an hour) and they go easily through a matted coat which an ordinary head would not touch. They clip closely enough for purposes of treatment. . . .

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(Diary of D.V.S., B.E.F., France, 1915.)

The quality of the blades issued for the clipping machines has not been satisfactory; a new head will only clip from two to six horses. The long, woolly coats and the dirtiness of the animals undoubtedly account for some of the trouble, but the steel from which they are made must be badly tempered. An auto-grinder has now been sanctioned for use and has so far proved satisfactory. . . .

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(Diary of D.V.S., B.E.F., France, February, 1918.)

The Director of Ordnance Services has remarked on the large number of hand-clipping machines that are rendered prematurely unserviceable owing to broken teeth. He considers that the damage is usually attributable to the fact that the leather shield gets lost and the teeth are left unprotected when the machines are not in use. To obviate this, a small tin guard, permanently attached to the clipper, has been designed. The guard costs less than a penny, and is fitted with a hinge to enable it to be pressed back out of the way of the blades when the machine is being used. The device has been tried at No. 5 Veterinary Hospital with excellent results, and the D.O.S. is being informed to that effect. . . .

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*Wastage from Preventable Injuries.**(Diary of A.D.V.S., 1st Division, France, July, 1915.)*

Inefficiency can, however, still be largely reduced as no less than 40 per cent. of all admissions for injuries and accidents (which form 60 per cent. of the total number of casualties) are due to two preventable causes, i.e. kicks and picked up nails.*

As this rate has been fairly constant, and to a certain extent unavoidable when horses were crowded in buildings during the winter, the division has lost the services of some 800 horses for periods varying from a couple of days to weeks. Since January, twenty-four animals had to be destroyed for fractures resulting from kicks.

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(Diary of A.D.V.S., 18th Division, France, October, 1915.)

Total number of kicks admitted in the division during the week was fifteen, and rope galls two. This reduction is largely attributable to the use of more heel ropes; the admittances in three weeks decreased as follows:—

				<i>Kicks.</i>	<i>Rope Galls.</i>
1st week	43	29
2nd week	24	2
3rd week	15	2

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(Diary of D.D.V.S., Cavalry Corps, France, September, 1915.)

The wastage of horses from kicks is extraordinarily high. In order to give some idea of the actual numbers, I give the following statistics of the past two weeks:—

Division.			Week ending	Number of Admissions of all kinds.	Number of Kicks.	Percentage.
1st	..	..	2.9.15	180	51	per cent. 27·8
2nd	..	..	2.9.15	182	43	
3rd	..	..	2.9.15	149	48	
1st	..	..	9.9.15	236	81	35·8
2nd	..	..	9.9.15	214	88	
3rd	..	..	9.9.15	133	40	
Total			—	1,094	351	32

It will be seen that in these two weeks, kicks are accountable for one third of the inefficiency of the horses of the cavalry corps. These figures are not selected in any way. Not only are kicks responsible for the heavy inefficiency but to them are due at least

* Subsequent experience and investigation showed that the condition known as "picked-up-nail" cannot be prevented to any great extent. (Editors.)

half of the destructions. As these latter roughly average about eight a week in the cavalry corps, the heavy loss to the State may be easily estimated. The cost of the provision of heel ropes to the cavalry corps would be less than the cost of the horses actually destroyed every fortnight on account of kicks. The question arises whether heel ropes will stop all this wastage. I consider it ought to stop 75 per cent. of the kicks if the shackles are regularly and correctly applied. There are some drawbacks, of course, and these may be summarised as follows :—

- (1) Considerable extra labour in fastening and unfastening horses.
- (2) In some cases, in narrow billets, it is practically impossible to use them.
- (3) In very muddy ground it becomes very difficult and the shackles are liable to chafe the legs.
- (4) There may be some difficulty in carrying them.
- (5) Theoretically, an extra peg will have to be carried. Practically, there is no real difficulty, for most units have by this time some long lines on which horses are tied, so the picketing pegs regularly carried could be used for the heel shackles.

The objections (4) and (5) might be met by leaving the shackles behind in the case of any big movements, and only using them when the force is more or less stationary. At any rate, the wastage from kicks is so serious that an effort should be made to minimise it, and I think heel ropes the most likely thing to do this if regular and sufficient exercise is impossible.

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(Diary of A.D.V.S., 50th Division, France, October, 1915.)

Over 50 per cent. of the casualties to animals in this division are due to injuries (mostly kicks, heel rope galls, and picked-up-nail).

The latter are more or less unavoidable, but kicks and heel galls occur mostly at night and are largely due to slackness on the part of stable pickets.

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Mange.

(Diary of O.G., No. 5 Veterinary Hospital, France, 1915.)

Five bad cases of sarcoptic mange received between them thirty-two lb. of sulphur ointment, and next day looked quite dry as though they had not been dressed.

We are clarifying all lard before applying it, as the salted lard causes blistering. The composition of the dressing is: sulphur one part, lard eight parts.

Lieutenant Perry, A.V.C., a Canadian officer who had a great deal of experience in treating mange in large numbers in Canada, is very anxious to demonstrate the value of freshly-prepared *hot* calcium sulphide solution. He is so confident of its efficacy that I am handing him over 250 cases (taken haphazard as they come in) to treat.

I am satisfied that sulphur in an oily base is effective, if properly applied, but it is expensive, needs a large amount of labour, causes loss of condition in the patients (of that I am certain), and also in many cases blistering.

Lieutenant Perry's method is to clip the patient all over and then scrub in, with a body brush, calcium sulphide solution at a temperature of 100° F.; groom daily for seven days; wash, dry, and reapply the dressing as before. He recommends three to four dressings, and is most emphatic as to:—

(1) The calcium sulphide being freshly prepared.

(2) The importance of applying it hot.

The cost of dressing a horse with sulphur and oil is from 4s. 6d. to 5s. The cost of the calcium sulphide dressing is less than twopence.

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(Diary of D.V.S., B.E.F., France, July, 1915.)

It has been reported by O.C. No. 5 Veterinary Hospital that cases of mange have arrived from the front having been dressed with linseed oil, which has dried, forming a varnished surface, greatly impeding further treatment.

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(Diary of D.D.V.S., B.E.F., France, 1915.)

I find that many horses which respond to scratching and are simply itchy from dirt are sent from the remount depot to the veterinary hospital as cases of mange. There, nothing being found the matter, they are cleaned, sometimes washed and clipped, and sent back. This chokes the hospital, but it is difficult to avoid as, although it shows a want of appreciation of the cause by the veterinary officer in charge of remounts, it is the result of much teaching as regards the danger from mange and the necessity for keeping the remount depot clear; when an officer is not self-reliant or sufficiently experienced he overdoes it. . . .

Wrote to all A.Ds.V.S., drawing their attention to the cases of skin disease which have been overdressed and are continually arriving at the receiving veterinary hospital at Neufchatel, and asked them to give explicit instructions that the use of paraffin or any other highly irritant dressing must cease. . . .

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Lice.

(Diary of A.D.V.S., 2nd Cavalry Division, France, February, 1915.)

It has been necessary to clip about forty of the worst cases of lice, and these are all doing well.

Inspected the horses of the Cavalry Field Ambulance. These horses are much improved, condition better, much cleaner, and lice well under control; in fact they appear to be free from lice now. Result of clipping.

Went round the billets of 5th Lancers and inspected bad cases of lice or any horse with symptoms of skin disease. These comprised ordinary cases of lice, but in several cases the skin had been damaged by the application of paraffin. When skin dressing is applied to horses with long coats I note that if the dressing is applied in the ordinary way there is practically no result as the skins remain dry, but if thoroughly applied there is often considerable damage caused to the skin, much worse than in clipped horses. Am having an order published in Routine Orders that no parasiticide dressing is to be used except on the recommendation of a veterinary officer. . . .

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(*Diary of O.C., No. 1 Veterinary Hospital, France. 1915.*)

Lieutenants ——— and ——— applied petrol to several horses infested with lice, and placed rugs on them a few minutes afterwards, which caused intense irritation. The horses at Villa Bartholémy were not rugged, and showed no irritation after application of petrol.

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Palpebral Mallein Test.

(*Diary of D.V.S., B.E.F., France, 1915.*)

Monsieur Donville, Vétérinaire en Premier 6me. Army, gave a demonstration at No. 5 Veterinary Hospital of the method of mallein inoculation which has recently been adopted in the French Army.

The advantages claimed for this method were explained by M. Donville, and at the same time he inoculated several horses, one of which was suspect.

The necessary operation for the intradermal method is in itself quite simple, and quickly done.

The soft texture of the skin of the eye-lid readily admits of the small dose of mallein required, $\frac{1}{10}$ c.c., being forced into its substance, but some dexterity is required to avoid penetration of the subcutaneous tissue by the needle.

The very small dose of mallein necessary is, under present conditions, a great advantage, and alone makes the method worthy of trial.

The horse which was previously suspect by reason of having shown an indefinite reaction to the subcutaneous method gave a pronounced and typical reaction at the 20th hour. Both lids, but especially the lower one, were oedematous to a considerable extent, and the region below the lower lid was highly sensitive over a considerable area.

There was a muco-purulent discharge from the eye which, however, did not appear in itself to be irritable. There was further a marked swelling of the sub-maxillary gland on the same side, with visible lymphatics radiating over the cheek.

The reaction was pronounced by M. Donville to be exceedingly typical, and to warrant the immediate slaughter of the animal.

The post-mortem revealed lesions that were definitely those of glanders, but were not very pronounced ; consequently the accurate detection of the disease, after only an indefinite reaction had been given by the subcutaneous method, suggests that the intradermal method may be a reliable form of testing.

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Respiratory Diseases.

(Diary of D.D.V.S., B.E.F., France, 1915.)

From February 1st to March 7th, out of 1,800 animals landed at Rouen, 1,040 were admitted to hospital with colds and pneumonia, of which 113 have died and 501 are now in hospital. Saw base commandant and told him all details and my opinion, which was that the main cause of the trouble was infection in England and en route, accentuated by rail journeys to the moment of embarkation and putting them on board when many were evidently infected, as shown by numerous rejections at the time of departure. In order to minimise losses, every care should be taken on this side, as follows :—

(a) An ambulance should meet each ship.

(b) If no reception shed is available at the quay the horses should be taken straight away without any unnecessary delay, in the smallest parties that can be arranged.

Out of a shipment of 319 heavy draught horses sent from Deptford on November 15th, 1914, and despatched to Orleans to horse the transport of the Indian Cavalry Division, 237 sickened from respiratory disease.

A second lot of 250 horses newly arrived was sent from Havre, 165 fell sick within a week. Again, a third attempt was made from recently arrived horses, and the majority were found to be sick.

The division was at last with difficulty completed with its transport from horses that had been some time in the country. The affections ranged from simple catarrh, with slight fever, to pneumonia, pleurisy and pericarditis ; many deaths resulted.

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Ringworm.

(Diary of D.D.V.S., B.E.F., France, 1915.)

A number of cases of ringworm have been admitted from the last two shipments of horses received, and doubtless it is becoming more prevalent. The heat of the deck or of the truck when horses are travelling appears to bring out the conditions with great rapidity, for, although a batch of animals may start clean to all appearances, yet after reaching the front, reports are received that a certain number have apparent ringworm in the skin. . . .

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*Quittor, France.**(Diary of D.D.V.S., B.E.F., France, 1915).*

Suggested operation without horn removal, if possible. Once the side of the hoof is stripped, the case is economically unsound during an ordinary campaign. It is six months at least, and perhaps more, before it can be cold-shod for work in mud. In civil practice these cases, with special shoeing, may be workable in six weeks, but for our purpose, and at the present "food value," they are better disposed of as soon as it is evident that recovery will be protracted. . . .

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*Anti-tetanic Serum.**(Diary of D.V.S., B.E.F., France, July, 1918.)*

Five months ago the Director-General, A.V.S., asked that enquiries should be made with a view to ascertaining whether the continued use of anti-tetanic serum was economically sound. Its actual value as a prophylactic was not questioned, but, owing to the high prices, a considerable saving would be effected if it could be discontinued without any marked increase in the incidence of tetanus. It was therefore decided to suspend entirely the use of the serum for three months in units at the front, and to see what results would follow. This period has now expired and there has been no rise in the number of cases of this disease; and it is not therefore proposed to resume the issue of the serum. During the week ending July 6th, only seven cases occurred in the whole force, which is about the same average number as occurred when the serum was being used for practically all gunshot wounds and punctured wounds of the feet.

The average number of doses of the serum issued monthly during the first half year of 1919 has therefore been but 1,013, as compared with 2,044 doses during the corresponding period of 1917, representing a gross saving of £985. . . .

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*Poisoning by Linseed Cake.**(Diary of D.V.S., B.E.F., France, August, 1918.)*

On August 3rd, 1918, D.D.V.S. (Southern) reported by telephone an outbreak of poisoning from linseed cake at No. 2 Base Remount Depot and No. 2 Veterinary Hospital, Havre. Two hundred animals are ill, but so far only three deaths have occurred. Investigation is proceeding. No doubt it is another case of poisoning from castor oil bean mixed in the linseed cake, and, though no particular report has been received, it is probable that the cake is of Spanish origin. Both at the remount depot and the veterinary hospital the cake was eaten dry, and it has been recommended that it should be boiled or steamed before use to avoid any further mishaps. This will have little or no effect if the cause is castor-bean poisoning, but

at the same time should the toxic symptoms be due to hydrocyanic acid, the heating should effectively destroy the enzyme necessary for its production. . . .

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Gas Poisoning.

(Diary of D.A.D.V.S., 35th Division, France, April, 1918.)

Ten cases of horses affected with mustard gas have been reported for the week ending April 18th, 1918. It has been confined to riders, and the cases occurred at Senlis, which place has been heavily gas-shelled.

It is likely that these animals have been ridden off the roads and across country in the vicinity of gas-shell holes, thus becoming affected, which would account for the cases being confined to riders.

The skin has presented lesions similar to the effects of a severe cantharides blister, varying in size from a few square inches to one or two square feet. The parts affected have been the delicate skin of the sheath and mammary glands. Patches have also been found about the pasterns and heels.

The animals become very lame and incapacitated for several days, depending on the parts affected. Cases are yielding to treatment with whale oil and lead acetate. Instructions have been issued that riders and other animals should not be taken into the vicinity of gas-shell holes if possible to avoid these. . . .

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(Diary of D.V.S., B.E.F., France, 1918.)

Ninety-five cases of gas poisoning were recorded during the week ending April 27th, which is a greater number than has occurred in any one week since last July. Of these ten proved fatal. The D.D.V.S., 3rd Army, states that the majority of these cases were apparently caused by mustard gas, and points out that ground, and especially muddy ground, which has been subjected to mustard gas shelling appears to become impregnated with the poison, and that the animals moving over it get blistered about the fetlocks, heels, thighs, and sheaths, and occasionally about the eyes, several days after the shelling of the ground has taken place. The necessity for avoiding ground which has recently been subjected to gas shelling is, therefore, obvious and in cases where it has to be used, such as sunken roads or tracts, treating it with chloride of lime would appear to be indicated. . . .

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(Diary of D.A.D.V.S., 49th Division, France, May, 1918.)

Seven horses have been affected with gas poisoning during the month. In one case a direct hit on a building with a gas shell immediately poisoned the horse outright ; also some fowls and some pigs in the same stable. In another case a gas shell exploded in

a stable, and six horses suffered from the effects of the gas ; all showed more or less severe bronchial catarrh. One animal died after an illness of three weeks ; a second animal at the end of one month had to be evacuated. The other four appear to be recovering. There was no blistering of the skin, and there were no eye symptoms. It is understood that the gas used was phosgene.

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Borna's Disease.

(Diary of D.V.S., B.E.F., France, February, 1918.)

A report was received on the 6th instant from D.D.V.S., Cavalry Corps, regarding an outbreak of disease amongst the horses of French civilians in the commune of Quisnoy, near Amiens. Up to that date seven horses had been attacked, of which five had died. The symptoms exhibited were loss of appetite and stiffness resembling slight laminitis, which lasted for five to ten days, when the animal goes down and is unable to rise. The animal appears to be in pain, strikes the air with its fore feet, and dies about the 9th-16th day after the onset. . . .

The G.O.C. lines of communication area now forwards correspondence emanating from the French civil authorities which attributes the malady to the animals watering from the local ponds, which are said to have been contaminated by British troops who were in the habit of washing their vehicles in the said ponds. They are also stated to have poured waste water containing oil, petrol, carbide, etc., into them.

To clear up the matter, the D.V.S. visited Quisnoy and took samples of water from all the ponds and sent them to the base hygiene laboratory for analytical examination. There is nothing to substantiate the statements made regarding the contamination of the ponds by the British troops, but the ponds are extremely filthy, and many of the local manure heaps drain into this district. It is realized, however, that water contaminated by organic matter is not ordinarily sufficient to produce fatal illness amongst horses.

The symptoms manifested closely resemble those which were shown during an outbreak of disease in October, 1915, among the horses of the 9th Heavy Battery, R.G.A., at Reninghelst, and which on that occasion was diagnosed as Borna's disease, or some form of cerebro-spinal meningitis, contaminated drinking water being regarded as the channel of infection. It has not been possible to make an exhaustive post-mortem of any of the cases at Quisnoy, and the only marked abnormality found was a peculiar pallor and friability of the heart muscle. Post-mortem examination of the Reninghelst cases revealed no abnormality of the abdominal and thoracic viscera, but showed acute congestion of the cerebral, cerebellar, and spinal blood vessels with exudation between these organs and their membranes.

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*Sea Transportation of Indian Cavalry**(Diary of D.D.V.S., Indian Cavalry Corps, France, 1915.)*

The horses generally travelled well, although the voyage from Bombay to Suez was very unfavourable owing to heat and a stern wind.

From the reports the mortality has been well under 1 per cent. in the Indian cavalry divisions. The main mortality occurred in ships in which horses were stored in alleyways, and in which permanent ramps were not fitted whereby horses could be brought when necessary on deck. . .

* * * * *

*Transportation of Australian Remounts to Marseilles.**(Diary of D.D.V.S., B.E.F., France, June, 1915.)*

Boarded S.S. "H.2." This vessel left Australia on April 3rd with 600 horses, and has lost 195 en route. The passage was calm. Maximum temperature by the log 90° at noon. There was a following wind in the Indian Ocean, which made the decks very stuffy, and during these days 50 per cent. of the deaths occurred. She had made a previous trip to Calcutta, losing 22 out of 640. In hold No. 4 the horses stood on the coal, and this had not been changed since the Calcutta trip. During the hot weather this became very foul, and 100 horses died in this hold. The boat was a good one, but had not been properly equipped for so long a voyage. There was an electric plant *but not one fan*, and there was no means of pumping out the urine from the decks. The horses were in the charge of one head groom and sixteen men, assisted by six of the crew.

* * * * *

(Diary of D.V.S., B.E.F., France, July, 1915.)

It has been reported by the base veterinary officer at Marseilles that, on the arrival of the S.S. "Itinda" on June 22nd, 1915, out of a consignment of 533 horses from Australia, 161 deaths had occurred. Few deaths on the upper deck; most occurred in the forward hold.

Twenty-six died in one day in the Red Sea. The temperature on that day was 104° F. in the forward hold and 'tween decks forward.

The deaths were due to pneumonia and heat. *Ventilation was bad*, port-holes being small. There was no means of flushing out 'tween decks or in the holds. The loss on this ship was 30 per cent.

This makes a total loss of 1,026 out of 5,635 animals which have arrived at Marseilles from Australia.

* * * * *

*Transportation of Animals, 46th Division, July, 1915.**(Diary of A.D.V.S., 46th Division, 1915.)*

An embarkation order was in existence at the time this division embarked for abroad (May, 1915), to the effect that the nose-bags

were to be suspended from the horses' necks prior to going on board. Those nose-bags as a rule carried about 12 lb. of corn. A large number of horses sustained serious injuries to their necks as a result of the nose-bags being carried in this way. A few hours suspension of the heavy bag was sufficient to cause injury of the most serious kind, necessitating long treatment, and probably in some cases destruction. The worst of these cases were of course evacuated to the veterinary hospital on the lines of communication.

* * * * *

Indian Personnel with Veterinary Units in France.

(*Diary of D.V.S., B.E.F., France, 1915.*)

An Indian field veterinary section, as at present constituted, is well off in syce personnel for grooming purposes and care of lines. but it falls short in trained dressers and in N.C.Os. for supervision and discipline. In Europe the provision of European farriers and shoeing-smiths is absolutely necessary. A nalband is of little use in shoeing heavy draught horses, and is at sea with the large shoes required by these animals. . . .

* * * * *

Chargers at the Base.

(*Diary of D.V.S., B.E.F., France, September, 1914.*)

In these days of motor cars it is simply a waste of horse-flesh to issue chargers to many officers of administrative services and others at the base. To get about quickly a motor car is necessary, and riding a horse over streets and tram lines in towns is a poor business. The consequence is that, in many instances, the horses are seldom or never seen by their owners, and have passed most of their time in dirty and insanitary stables. . . .

* * * * *

Veterinary Stores, France, 1915.

(*Diary of O.C., No. 5 Veterinary Hospital.*)

Certain stores, notably soap, linseed oil, bandages, flannel, and tow, which are used for veterinary purposes, have to be obtained from the Army Ordnance Department. This arrangement has proved most unsatisfactory, and on several occasions I have been delayed in my treatment, particularly of mange cases, through queries being raised on my indents. An ordnance officer naturally finds it difficult to understand that mange cases, treated with oily dressings, require washing every week, and when one has 600 cases, as I have, he cannot believe that one's requirements are 5 cwt. of soap weekly. Units at the front are constantly making demands on the advanced depot of veterinary stores for these items, only to be told that these veterinary stores are not supplied by them but by the Army Ordnance Department, which probably means a delay of a fortnight in obtaining the stores or longer if,

as often happens, the A.O.D. queries the necessity. In my opinion, veterinary stores should supply all articles necessary for the treatment of cases, even if the base stores have to draw them in bulk from the A.O.D.

* * * * *

Captured Animals, Palestine, 1918.

(Diary of D.D.V.S., Desert Mounted Corps, September, 1918.)

September 21st. Advanced headquarters of Desert Mounted Corps located at El Lejjun, and the battle proceeding. During the morning a big convoy of prisoners of war came down, and with them a number of animals, mostly half-starved and very weak. Twenty-seven very good camels, however, were taken, and in the evening there were also 150 mules and ponies near the well. As there was no other personnel available I sent a serjeant and the four native camel clippers to hold these up. I had the greatest difficulty with these captured animals and at last got some local labour, and Serjeant Spinetto drove them down to Ras-el-Ain. I did not think it advisable to order the 10th A.M.V.S. to take charge of them as this unit was awaiting orders to move up to join its brigade; nor was it right to employ the personnel in evacuating these debilitated and possibly diseased animals instead of looking after government horses.

September 25th. Conferred with the veterinary officer of corps headquarters, who had returned from El Lejjun the previous night, and he informed me that he had inspected the captured stock there and found twenty-four of them (including one mule glandered) unfit to travel, and had shot them. The remainder left with the prisoners of war convoy for Ras-el-Ain. . . .

September 26th. Moved to El Lejjun and reported at advanced headquarters. Found that another large collection of captured animals had arrived and that there was difficulty in dealing with them owing to lack of personnel.

No. 10 Cavalry Brigade Mobile Veterinary Section (Captain Armstrong) was camped at the spring, and I gave him instructions to examine these animals, shoot the useless ones, and help to clear the remainder.

Met Captain H. B. Williams, A.V.C., who had brought some sick horses of the 10th and 12th Cavalry Brigades for evacuation by No. 10 Mobile Veterinary Section from Beisan. He told me that they were in a very bad state. The Turks do not appear to have fed their horses at all. He had shot over 200 in two days. They were so weak that they got stuck in the mud in crossing shallow streams. . . .

* * * * *

Disposal of Animals.

(Diary of D.D.V.S., B.E.F., France, 1915.)

The number of destructions is large, but they are all cases which it is hopeless to treat, e.g. open hock joints; and one is very glad to be able to get 200 francs (butcher's price) for them. Often it

becomes a point for decision whether it is not better to destroy a horse straight off and get 200 francs than to treat him for three or four weeks (at a probable cost of 40 francs a week), and then have to cast or sell him for 250 or 300 francs.

Examined 450 horses at reception lines from the front and cast 44 for sale. This I did as a test, and am convinced that with a better organization at the receiving point it will be possible to weed out a good many animals of no further use and so relieve the hospitals where, once they are admitted, there is a tendency, a laudable tendency, to persist in treatment beyond what I consider is the economic limit. . . .

* * * * *

(*Diary of D.V.S., British Salonika Force, February, 1918.*)

The following are the results of fat extraction from the carcasses of dead animals for the month of January :—

	No. of carcasses boiled.	Fuel consumed.	Fat produced.	Average fat from each carcass.
			lb.	lb.
No. 18 V.H. ..	59	Nil.	2,184	37·0
No. 30 V.H. ..	100	Nil.	5,091	50·91

The increased amount of fat from each carcass is due in part to the improved condition of animals of the force, there being now relatively few debilitated animals. The method has, however, now been improved. It is satisfactory that no fuel is required. I have verified that the ordnance figures agree practically with those given above, allowing for a slight reduction due to extraction of water.

* * * * *

Disposal of Animals, France, 1920.

(*Diary of D.D.V.S., British Troops in France and Flanders, May, 1920.*)

The Remount Directorate in this command ceased to exist on March 29th, 1920, and all correspondence and returns for this department are now being dealt with by "Q" Branch, General Headquarters. Meanwhile, with the exception of the animals arriving at Marseilles from Egypt, all others which become surplus to requirements are now being handled and disposed of by the veterinary services. No. 5 Base Remount Depot having been closed down on March 20th, 1920. In fact, this situation had been in process ever since the armistice, when it was decided to hand over to the veterinary services the disposal of all surplus animals for sale in France. During the period November 11th, 1918, to March 31st, 1920, the sum of 172,684,920 francs (net), has been realized for the sale of animals for work, animals for food and by-products, by the

veterinary services, British troops in France and Flanders, leaving in this country on this date only some 1,600 animals to be dealt with.

These figures speak for themselves, and although considerable assistance in handling the animals in question was, in many cases, received from the units to which they belonged, it will be seen that the actual disposal of and accounting for almost all the surplus animals belonging to the late British Expeditionary Force has fallen on the veterinary services. It would appear to me to be a matter for consideration whether it would not be advisable, and at the same time a considerable economy to the State, if the veterinary services were not only permanently charged with the disposal of all surplus and cast animals, but were also charged with the care and management of all animals belonging to the army from the time they are purchased until they are issued to units; in other words, that the remount service should confine itself to purchasing the animals. Personally, I am of opinion that a tremendous saving in personnel could be effected thereby, without any loss of efficiency.

CHAPTER XXXI.

DISPOSAL OF ANIMALS.

THE circumstances of a modern European war, waged on a large scale, with lines of communication in closely settled civilized areas, made it necessary, for sanitary and economic reasons, that there should be fully organized military arrangements for the disposal of carcasses of animals that died or were destroyed in veterinary hospitals.

The German military authorities appear to have seen ahead of others in this respect by installing, at a comparatively early stage of operations, a carcass disposal factory on their lines of communication.

In the British army the need for these arrangements was first felt in France.

In the other theatres of war the difficulties were obviously less ; in the United Kingdom the existing civil horse slaughtering industry was found to be able to deal with all the carcasses from veterinary hospitals, but on conditions that were not profitable to the State.

A beginning was made in December, 1916. The first essential step in building up an organization of which the Army Veterinary Services had no former experience was that of obtaining the services of a commercial expert in this class of business.

The Secretary (Mr. H. A. Crowe) of Messrs. Harrison, Barber & Co., the great horse slaughtering firm in London, offered his services, and he was given an honorary temporary commission with the rank and pay of a lieutenant, A.V.C. After a short period of duty in England, which was occupied in enquiring into the arrangements for disposal of carcasses from veterinary hospitals in the United Kingdom, and advising how these could be improved, he was sent to France to organize and control, under the Director of Veterinary Services, the arrangements which had already been set on foot in that theatre.

Letters, stating what was being done and describing in outline the methods for economic disposal of carcasses suggested by Lieutenant Crowe, were at the same time sent by the Army Council to the other theatres of war.

Lieutenant Crowe subsequently went to Salonika to inspect and advise upon matters there.

Simultaneously with the initiation of the arrangements for the better organization of this work in the United Kingdom, a proposal was made by the Army Waste Products, Limited (a military trading company duly appointed by the Army Council), to take over the disposal of carcasses in conjunction with their existing organization for disposal of camp refuse. The veterinary branch of the War Office at first opposed this suggestion because it was considered that it would be difficult to co-ordinate the efforts of the A.V.C. personnel with those of Army Waste Products, Ltd., an objection which subsequent experience justified. A compromise was ultimately

effected on the basis that, in those areas where Army Waste Products plants were installed, carcasses should be sent to those plants for disposal but that in other areas where existing arrangements were satisfactory the Army Veterinary Services would deal with the matter. An officer of the Army Veterinary Corps was then included in the Directorate of Army Waste Products, Ltd.

Prior to January, 1917, all carcasses of animals that died or were destroyed in the United Kingdom were disposed of to horse slaughtering firms by contract at from 10s. to 30s. a carcass. The arrangements made by the Army Veterinary Services in the United Kingdom were limited to carcasses from veterinary hospitals, and were briefly as follows :—

- (a) A Carcass Disposal Section, comprising at most three other ranks and including an acting serjeant or acting lance-corporal, according to the amount of work to be done, was added to the establishment of the veterinary hospital where it was proposed to deal with carcasses.
- (b) The carcasses were skinned, and the flesh was removed from the bones.
- (c) The hides were disposed of to the tanners on the War Office list of approved firms at the fixed rate.
- (d) The flesh was disposed of to horse slaughtering firms at an agreed price.
- (e) The bones and hair were sent to the nearest Army Waste Products plant.

Each carcass disposed of in this way realized about £4.

The effect of our efforts on the market, however, was that, in some instances, horse-slaughtering firms raised their prices for carcasses to a rate at which it was no longer profitable for the work to be done by A.V.C. personnel. When this occurred, the carcasses were sold to civilian firms, and the detachment was released for other duty.

Later, when the meat shortage in England became acute, a series of conferences was held with firms of butchers to determine to what extent it might be possible to establish the sale of horse meat in London and Liverpool, and thus to utilize the flesh of otherwise healthy animals that it was necessary to destroy on account of chronic lameness or other condition which rendered them unfit for further work. It was agreed that, if arrangements could be made for horses to be slaughtered in a proper slaughter house, free from the associations of a "knacker's yard" and certified by inspection to be free from disease and fit for human food, many people might be disposed to consume horse flesh who hitherto for good reasons had held aloof.

It was ultimately decided that the measure ought to be tried, and arrangements were set on foot simultaneously in London and Liverpool.

Sanction was obtained for the appointment to the A.V.C., with the honorary temporary rank of lieutenant, of a non-commissioned officer who had been a butcher in civil life. This officer

supervised the arrangements and acted as a connecting link between the Army Veterinary Services and the firms of contracting butchers.

The arrangements made in London were as follows :—

- (a) An agreement was entered into with a large firm of butchers, whereby they undertook to open a slaughter-house and to receive army horses for slaughter on condition that a certain supply was guaranteed.
- (b) The contractors paid for the horses by weight.
- (c) With the approval of the Local Government Board and the Superintendent of the Metropolitan Cattle Market, a slaughter-house in the abattoir was rented for the sole use of the scheme.

Similar arrangements were made in Liverpool.

The plan worked well, and it became possible to dispose of large numbers of otherwise worthless animals at prices which varied between £9 and £12.

When matters were in full working order, it was decided to make a strong effort to overcome the reluctance of the Director of Prisoners of War to agree to the issue of horse flesh as a ration to prisoners of war. Efforts had been made before, but now that horse flesh was being prepared for human consumption on a large scale under perfectly hygienic conditions, with the full approval of the highest civil and military sanitary authorities, it was felt that the position was greatly strengthened.

The Medical Directorate of the War Office, the Director of Supplies, and the Ministry of Food all agreed that the proposal was reasonable, and gave it their support. It was pointed out that the flesh from more than 200 horses was being consumed weekly by the civil inhabitants of England on account of the scarcity of beef and mutton, while at the same time the latter foods were being issued in large quantities to prisoners of war of races who were habitual eaters of horse flesh.

Ultimately the arguments prevailed but not until nearly twelve months had elapsed from the time when the representations were first made, a delay that for economic reasons can only be regretted.

As soon as sanction was given for the issue of horse flesh to prisoners of war, arrangements were made, in conjunction with the Director of Supplies, for the official meat contractors to receive the weights of horse flesh they required. At the same time, permission was given to our contractors to extend their horse-slaughtering operations to animals from civilian sources.

The problem of disposing, in an economic and humane manner, of horses no longer fit for work was thus finally solved, both during the war and on demobilization.

No separate turbine plant for dealing with the carcasses of army animals was established in the United Kingdom. Army Waste Products, Ltd., it is true, decided to establish a plant, but there were many delays, and by the time it was ready to receive carcasses the war was over and there were no carcasses for it to receive. The

delay was due to the priority which was properly given to the supply of fat-extracting machinery for the purposes of camp refuse and to the requirements of the British expeditionary force.

If proper facilities, including a turbine fat-extracting plant, had been available in the Salisbury Plain area during the first two years of the war, great savings would have been effected in money and material.

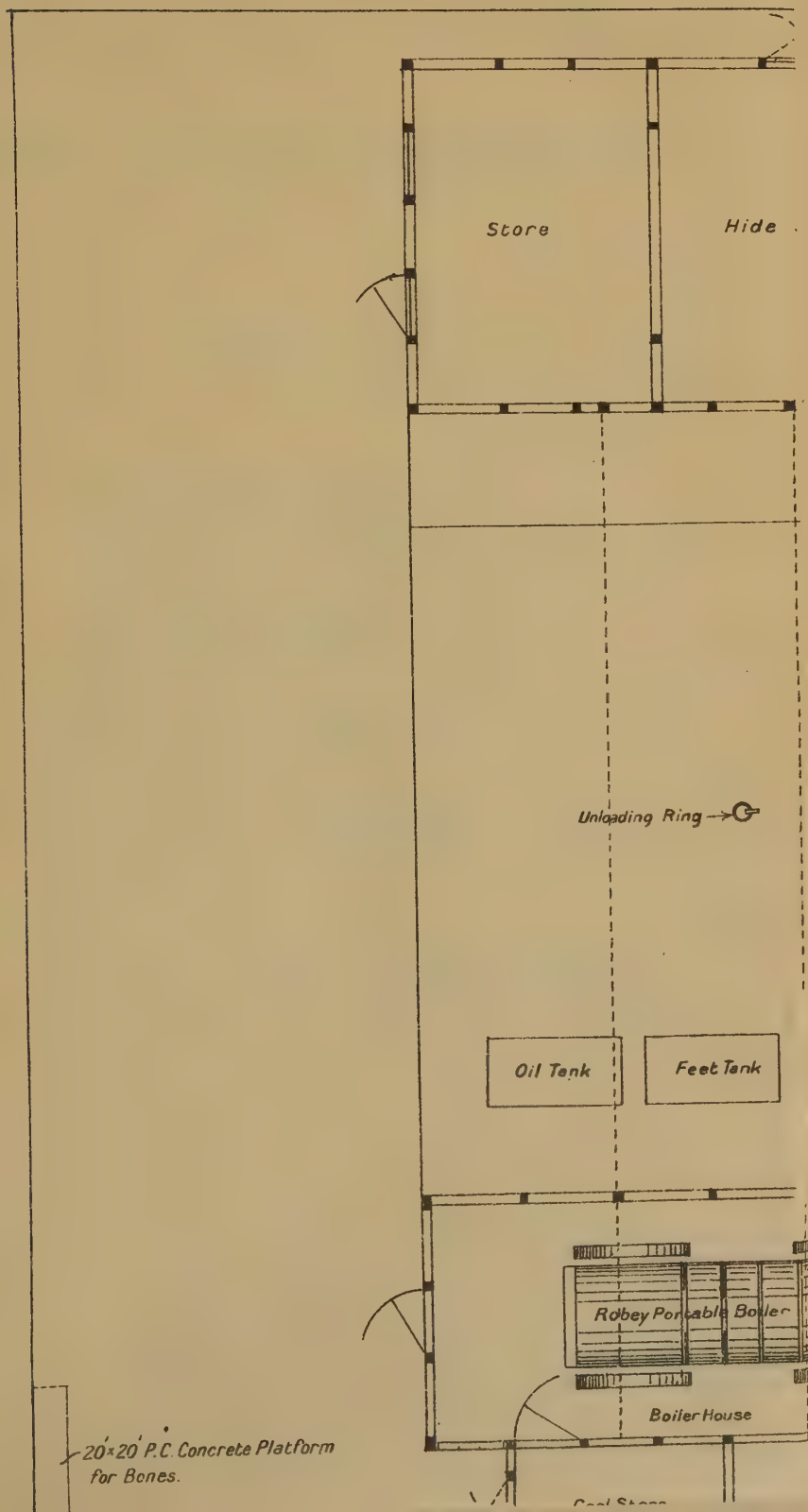
At one period of the war, owing to the ban which was placed on the export of hides from the United Kingdom and to the number of horse hides which were being received from France, there was a glut on the London hide markets. As this over-stocking was coincident with a grave shortage of leather, the Director of Army Contracts formed a special committee to deal with the matter. The War Office was also represented on this committee by an officer of the army veterinary service. The over-stocking of the markets with horse hides, apart from the reasons stated, was due to the reluctance of British tanners to undertake the tanning of horse hides, which hitherto had been almost entirely a German and American industry.

The terms of reference to this committee were concerned with finding ways and means to overcome this difficulty.

Ultimately, by means of calling all the principal tanners together, by making experiments, and by fixing prices on a basis that would make it profitable for tanners to introduce new methods, the difficulties were overcome.

Arrangements for the disposal of carcasses in France were necessarily on a far larger scale. It was found advisable to include these arrangements as part of the duties of a separate organization known as the Disposal of Animals Branch, which also controlled the sale to agriculturists, in conjunction with the French authorities, of cast animals fit to work on the land. This branch was established and distributed as follows :—

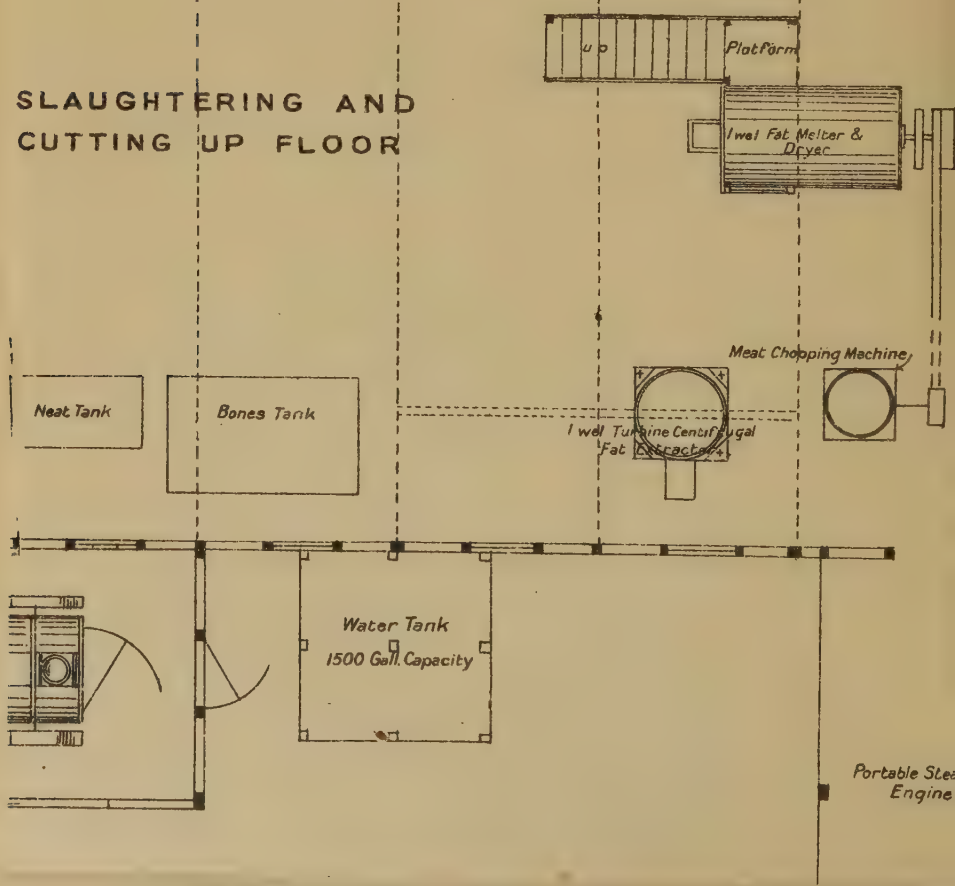
	Total Personnel.	
	Officers.	Other Ranks.
(i) 1. Headquarters attached Headquarters Director Veterinary Service	1	2
(ii) 8. Horse carcass economiser detachments, each consisting of fourteen other ranks at :—		
Havre	—	112
Rouen		
Abbeville		
Forges-les-Eaux		
Neufchatel (P. de C.)		
Calais		
St. Omer		
Gournay-en-Bray		
(iii) 2. Butchery detachments, each of four other ranks at :—		
Boulogne	—	8
Abbeville		
(iv) 1. Paris sales detachment	1	2
Total ..	2	124





P.C. Concrete Pavement

SLAUGHTERING AND CUTTING UP FLOOR



Portable Steam
Engine

The officer in charge of this branch was the specialist mentioned above as having gained his experience with Messrs. Harrison, Barber & Co.

The duties of the Disposal of Animals Branch were :—

- (a) The sale to agriculturists of cast animals fit to work on the land.
- (b) The sale to approved contractors in Paris or other towns of animals fit for human food.
- (c) The preparation of carcasses fit for human food, and disposal of the products to contractors or to the Army Service Corps for issue as a meat ration to prisoners of war.
- (d) The disposal of carcasses of animals unfit for human food.
- (a) *Sale to Farmers.*—In the interests of French farmers, auction sales of cast horses and mules were arranged at intervals in certain agricultural centres. A local auctioneer was appointed who advertised the sale at his own expense. The conditions of sale were :—
 - (i) Animals only to be sold to purchasers who could furnish a certificate from the Mayor of the Commune that they were genuine farmers or breeders.
 - (ii) Not more than two animals to be bought by a purchaser at any one sale.
 - (iii) Animals to be sold subject to a reasonable reserve price.

The object of these conditions was to prevent speculation by dealers and to ensure, as far as possible, the humane treatment of animals sold.

The purchaser received with each animal a certificate describing it fully, and stating that it was free from contagious disease and had been tested with mallein.

(b) *Sale for Food to Contractors.*—A good market for horse flesh fit for human food was found among the civil inhabitants in the lines of communication area. At first, sale was restricted to horse butchers who lived near veterinary hospitals, but when the supply exceeded the local demand, contracts were made with approved firms of butchers in Paris.

Animals selected for disposal in Paris were sent by train, in charge of a conducting party of A.V.C. subordinate personnel, who handed them over at the end of the journey to the contractors' representatives; the latter were accompanied by a serjeant, A.V.C. An officer was stationed in Paris to arrange local details, to ensure the proper observance of the contract and the humane slaughter of the animals.

(c) *Preparation of Animals for Food by Army Veterinary Corps Personnel.*—Some animals selected for slaughter were unfit to travel to Paris, and local horse butchers lacked the labour to deal with them. Consequently, butchery detachments, comprising one serjeant and three rank and file, were formed at Abbeville and Boulogne.

The animals were carried, if necessary, by float to the local abattoir, a section of which was rented from the municipality;

they were slaughtered and the carcasses were disposed of by the following means :—

- (i) Sale to local contractors.
- (ii) Sale to contractors in Paris.
- (iii) Delivery to the Army Service Corps for issue to coloured labour companies or prisoners of war.

(d) *Conversion of carcasses into by-products by carcass-economiser plants.*—Horse carcass economiser plants were installed at the places already indicated. At first, the method of dealing with the carcasses was necessarily incomplete, and was as follows :—

- (a) The hair was removed with sheep-shears from the mane and tail and dried.
- (b) The hide was taken off, salted and stored in salt pending shipment to England.
- (c) The flesh was removed from the bones and the fat was separated from the flesh.
- (d) The fat was rendered down by boiling ; the bones were boiled to recover as much as possible of the fat they contained.
- (e) The flesh was buried in the manure dumps.

At a later stage, when it was possible to obtain suitable machinery in the form of digesters, dryers and fat extractors, carcasses were dealt with much more economically. By means of this machinery the flesh, instead of being buried, was dried and granulated for sale, and the bones were completely degreased.

Each of the horse carcass economiser plants could deal with thirty carcasses a day.

The type of plant chiefly used was that known as the "I.W.E.L.," manufactured for the purposes of fat-extraction and flesh drying by The Industrial Waste Eliminators Co., Ltd.

All hides were sent to England for allocation to the tanners at the prices fixed by the Ministry concerned.

During the period September, 1916, to March, 1919, no less than 36,877 hides were shipped.

This supply was an important addition to the resources of the country at a time when there was a great shortage of leather.

The by-products from the horse carcass economiser plants were sold to merchants in England, Paris and elsewhere. The average amount and value of the by-products obtained from an animal of 10 cwt. (live weight) were as follows :—

By-products.	Amount.	Average amount.
Hide	—	£ s. d. 1 0 0
Flesh (dried)	1 cwt.	1 9 3
Grease	3 gallons.	1 5 0
Bones and hoofs	1 cwt.	0 5 0
Hair	$\frac{1}{2}$ lb.	0 0 9
	Total ..	£4 0 0

In the vicinity of the front line, and in army areas where no facilities existed for more thorough disposal, the carcasses were flayed and the hides salted and sent to reception veterinary hospitals, whence they were handed over to horse carcass economiser plants for despatch to England. The rest of the carcass was buried.

The work performed by the Disposal of Animals Branch from its formation up to 11th November, 1918, is revealed in the following figures :—

Detail.	No. of animals.	Approximate amount realized.		
		£	s.	d.
Sold by auction to farmers and breeders ..	7,775	168,868	0	0
Sold to Paris horse butchers	28,384	364,438	0	0
Sold to local horse butchers	16,578	231,621	0	0
Dealt with by butchery detachments and sold as dressed carcasses	3,552	44,106	0	0
Dealt with by butchery departments and issued to labour companies or prisoners of war ..	984	21,100	0	0
Dealt with in horse carcass economizer plants for conversion into by-products	7,061	28,244	0	0
Total ..	64,334	£858,377	0	0

During the period which intervened between the armistice and general demobilization, the resources of the Disposal of Animals Branch were utilized to the full. Under the original demobilization arrangements, it was decided that the Director of Remounts should control the sales of surplus animals fit for work, but early in February, 1919, it became necessary to accelerate the rate of disposal of animals in this category, and the policy of sole control by the remount department was revised. General officers commanding armies and lines of communication were instructed to extend the sales in conjunction with their Deputy-Directors of Veterinary Services and Deputy-Directors of Remounts. Sales organized by the veterinary and remount services then proceeded simultaneously.

The veterinary services proved to be well equipped for their share of this duty. The chain-organization of mobile veterinary sections, veterinary evacuating stations and veterinary hospitals was naturally adapted to form centres for the collection of surplus animals. Moreover, many of the officers R.A.V.C., owing to experience gained in organizing sales during the war, were thoroughly acquainted with the procedure of French auction and methods of accounting. Consequently, it was found possible to carry out the sales speedily and successfully.

The following figures show graphically what was done in the matter of disposal of animals during the period of the armistice and subsequently up to March 31st, 1919 :—

Detail.	No. of animals.	Approximate amount realized.		
		£	s.	d.
Sold by auction to farmers and breeders ..	112,132	3,778,907	0	0
Sold to Paris horse butchers	8,664	160,474	0	0
Sold to local horse butchers	20,679	414,919	0	0
Dealt with by butchery detachments and sold as dressed carcasses	—	—		
Dealt with by butchery detachments and issued to labour companies or prisoners of war	3,903	76,665	0	0
Dealt with in horse carcass economizer plants for conversion into by-products	6,699	26,796	0	0
Total ..	152,077	£4,457,761	0	0

In Italy the salvage value of animals presented, as in France, a commercial interest with respect to the disposal of unserviceable animals, either in the form of by-products or as meat for human consumption. The disposal of the latter was, in Italy, of the greater importance, partly by reason of the great demand to meet the food requirements of the civil population. The chief centres of the trade were Cremona and Milan. Ten per cent. were, however, sold locally in the forward areas.

When the British force arrived in Italy, in December, 1917, the price obtained for butcher's meat was lire 1·15 per kilo live weight. This gradually improved until lire 3·50 per kilo was obtained by contract.

On the armistice being signed there was a slump in the market, and the Italian Government, having prohibited the canning of horse-flesh, the price fell to lire 2·70 per kilo, but this price could not be maintained after December, 1918.

When the demobilization of animals was hastened in order to release the personnel as quickly as possible, and also in order to save the expense of keeping the animals, any offer of lire 2·00 and over per kilo was accepted.

Later, 2,074 animals were sold by commission at Milan, the price gradually recovering until lire 3·00 per kilo was realized after paying commission agent's fees (3 per cent.).

The last contract at Milan was lire 3·20 per kilo live weight. the following is a résumé of sales :—

From November, 1917, to November 7th, 1918.

	L	L.
Forward Area :—		
111 animals sold to butcher ..	23,662·20	
13 carcasses	2,028·00	
Lines of Communication :—		
1,171 animals sold to butcher ..	1,219,118·35	
48 carcasses	5,820·00	
	<hr/>	1,250,628·55
21 animals cast and sold to farmers, 20/4/18	31,610·00	
24 animals cast and sold to farmers, 15/6/18	44,694·00	
	<hr/>	76,304·00

From November 8th, 1918, to May 15th, 1919.

3,968 animals sold to butcher ..	5,040,318·25	
31 carcasses	6,700	
	<hr/>	5,047,018·25

During the Whole Period.

749 hides	12,029·85	
Hair	473·80	
	<hr/>	12,503·65

Grand total realized on salvage during the whole period ..	Lire 6,386,454·45
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Approximately £212,881 sterling at current rate of exchange.

The local disposal of animals cast from the army as unfit for further army service, or surplus to requirements yet fit for civilian work, was arranged, but before the animals passed into other hands an enquiry into the conditions of protective guarantees was made to ensure, as far as possible, their being well treated. The heads of accredited agricultural societies were interviewed and the conditions drawn up. Great assistance was received from Provincial Veterinario Dott Cav. Provido Sacco of Cremona.

The principal conditions were as follows :—

- (1) That an officer of the British Army Veterinary Service or other British representative should be permitted to inspect the animals from time to time.
- (2) That the animals should not be re-consigned to another party or disposed of without the previous consent of the society and confirmation by the British military authorities.
- (3) That the societies should control the distribution of animals to agriculturists and guarantee compliance with the conditions laid down for their protection.

In Salonika, also, much useful work was carried out by the army veterinary service in the economic disposal of carcasses. It was not thought expedient to send special plants with modern machinery to Salonika, but full arrangements were made for the disposal of carcasses by the more simple methods which have been already described.

Large quantities of the horse fat obtained were delivered to the A.O.D. for the manufacture of soap in an improvised factory.

In the remaining theatres of war little was done in this respect so far as horses and mules were concerned. Local markets did not exist in those theatres; consequently there was little opportunity for the profitable disposal of by-products.

A great deal was done, however, in Egypt, in the disposal of camels for human food, notably at No. 1 Camel Hospital in the Cairo area. Full particulars are given under the heading "Disposal of Camels" in the chapter of this history which describes the working of the camel hospitals in Egypt.

Disposal under Demobilization Regulations.

The arrangement finally agreed between the remount department and the veterinary service for the disposal of surplus animals of the army on demobilization was that all horses and mules were examined by boards of veterinary officers, who classified them into the following categories :—

- (a) Between five and eight years and serviceably sound.
- (b) Between eight and twelve years and serviceably sound.
- (c) Over twelve years or unsound.
- (d) Only fit for destruction for food and by-products.

The animals in categories A, B and C with the British expeditionary force were re-classified into :—

- (x) For the post-bellum army and the army of the Rhine.
- (y) For repatriation to England for sale.
- (z) For sale on the continent.

A similar system of re-classification for ultimate disposal was adopted, as far as conditions allowed, in other expeditionary forces, where arrangements were more difficult because, neither could the serviceable animals (for veterinary reasons) be repatriated to England for sale, nor, for other reasons, could they all be sold locally. The unfortunate consequence was that, after every available channel of useful disposal had been explored, there remained in some theatres of war a surplus of serviceable animals which could only be destroyed.

Contrary to expectations, the disposal of animals in northern Europe and the United Kingdom presented no economic difficulties.

The prices received for animals were well maintained, and it is possible that, even if the considerable numbers earmarked for the boarding-out scheme had been put on the market, the prices would not have suffered.

This unexpectedly happy turn of events was beyond doubt largely due to the confidence of the public in the healthy condition, the soundness, and the freedom from contagious disease of British army animals, a success for which the Army Veterinary Services may reasonably claim credit.

The business of disposal of animals on the continent, surplus to the requirements of the army of the Rhine, was carried out with remarkable despatch. (See page 679.)

As with other expeditionary forces, immediate steps were taken to get rid of all category "D" animals for economic reasons, and in order to make room in the veterinary hospitals for serviceable animals awaiting disposal.

Reference has already been made to the comprehensive arrangements for the sale of serviceable animals in France which were carried out by personnel of the Army Veterinary Corps.

APPENDIX A.

VETERINARY EQUIPMENT AND STORES.

I.

LIST OF THE PRINCIPAL MEDICINES, DRESSINGS, INSTRUMENTS AND FIELD EQUIPMENT ISSUED FROM THE ARMY VETERINARY STORES DURING THE PERIOD 1ST AUGUST, 1914, TO 31ST DECEMBER, 1918.

Acid, Arseniosum Tablets ..	2,205,007	Potassii, Iodid.	3,654 lbs.
Acid, Boricum	106,465 lbs.	Potassii, Nitrates	39,911 lbs.
Acid, Carbolicum, liq. . .	14,053 lbs.	Potassii, Permanganas ..	2,897 lbs.
Adrenalin Tablets	181,428 tablets	Sapo, Carbolicum	80,558 bars.
Adeps, Preparatus	130,239 lbs.	Sapo, Durus	45,199 bars.
Aether	1,942 lbs.	Sapo, Mollis	162,611 lbs.
Alcohol, Absolute	811 lbs.	Sapo, Mollis, Mercurial ..	19,803 lbs.
Aloes, Barb. Pulv.	1,622 lbs.	Sheep Dip, "McDougals" ..	14,719 pints.
Aloes, Barb., Balls	1,126,691 balls.	Sinapis, Pulv.	47,545 lbs.
Ammon. Carbonas	12,064 lbs.	Sodii, Carbonas	88,570 lbs.
Ammon. Carbonas, Balls ..	2,174,087 balls.	Sodii, Hyposulphis	5,263 lbs.
Ammon. Chloridum	2,908 lbs.	Sodii, Salicylas	1,090 lbs.
Anti-Strangles Serum ..	40,581 doses.	Sodii, Sulphas.	6,957 lbs.
Anti-Tetanus Serum	40,442 doses.	Sodii, Carbonas Tablets ..	15,132 tablets.
Areocolin Tablets, 2 gr. .	171,657 tablets.	Spiritus, Aether Nitrosi ..	27,197 lbs.
Atropine Sulph. Tablets, $\frac{1}{2}$ gr.	22,151 tablets.	Spiritus, Ammon. Aromat. ..	18,619 lbs.
Camphora	18,408 lbs.	Spiritus, Methylatus .. .	74,181 pints.
Chloral Hydras Balls (tubes of 6)	108,288 tubes.	Staphisagras, Pulv. . . .	4,879 lbs.
Chloral Hydras Balls	1,612,323 balls.	Strychninae, Hydrochlor Tablets	1 gr. 282,180 tablets.
Chloroform	9,292 lbs.	Sulphur Sub.	2,061,091 lbs.
Cocaine Hyd. Tablets, 1 gr. .	221,487 tablets	Theriaca	55,242 lbs.
Creasotum	6,649 lbs.	Tintura, Ferri Perchlor. . .	1,006 lbs.
Cupri Sulph.	18,612 lbs.	Tintura, Iodi	38,333 lbs.
"Coopers" Cattle Dip	66,360 pints.	Tintura, Opii	2,078 lbs.
Eusol.	363,171 packets.	Unguentum, Acid, Boric. . .	7,009 lbs.
Extract Belladonnae Viride ..	2,888 lbs.	Unguentum, Hydrargyri ..	3,137 lbs.
Ferri Sulph.	10,199 lbs.	Unguentum, Zinci	1,328 lbs.
Hydrargyri Perchloridum Tablets	18,473 lbs.	Zinc, Chlorid. (Fused Sticks)	1,374 lbs.
Hydrargyri Subchlorid Tablets	1,976 lbs.	Zinc, Oxidum	17,727 lbs.
Iodoform Pulv.	934 lbs.	Zinc, Sulphas. Tablets ..	30,388 lbs.
Iodum Resublim.	1,898 lbs.	Zingiber, Pulv.	4,859 lbs.
Iodine Powder, Tubes	1,071,473 tubes.		
Kaolin	4,556 lbs.	Bags, Poulrice.	137,000
Lini Farina	18,347 lbs.	Bandages, Broad	5,475,202
Linimentum Alba	77,978 lbs.	Gauze, Antiseptic	154,993 packets.
Liquor, Ammoniae Fort ..	4,720 lbs.	Jaconet	1,667 yards.
Liquor, Arsenicalis	4,159 lbs.	Ligature Flax	26,954 hanks and reels.
Liquor, Calcis Sulph. . . .	43,905 lbs.	Ligature Silk	32,420 hanks and reels.
Liquor, Cresoli Co. . . .	78,090 lbs.	Lint, Medicated	24,897 lbs.
Liquor, Plumbi Subacetat Fort	945 lbs.	Plaster, Adhesive	1,236 tins.
Liquor, Tobacco Extract ..	10,966 lbs.	Smocks, Operating	1,873
Magnesi Sulphas.	553,748 lbs.	Tape	10,278 pieces.
Mallein	1,760,749 doses.	Tow, Medicated	131,005 lbs.
Morphine, Sulph. Tablets, 4 gr.	20,859 tablets.	Tubing, Drainage, Tubes of ..	551 tubes.
Morphine, Tart. Tablets ..	171,646 tablets.	Wool, Absorbent	233,036 lbs.
Nicotine Solution	9,091 pints.	Bottles, Glass, various ..	186,884
Nux Vomica Pulv.	6,511 lbs.	Bottles, Stone, various ..	14,937
Oleum, Cetacei	420,163 pints.	Bottles, Tin, various ..	16,687
Oleum, Eucalypti	11,803 lbs.	Cases, Skeleton	5,734
Oleum, Lini	215,738 pints.	Cases, Wood Packing, various	29,740
Oleum, Olive	34,097 pints.	Casks, various	4,271
Oleum, Rapii	22,825 pints.	Drums, various	42,874
Oleum, Terebinth. . . .	123,019 pints.		
Paraffinum, Antiseptic ..	22,163 lbs.		
Paraffinum, Mollis	107,572 lbs.		
Physostigminae, Sulph. Tablets,	1 gr. 23,763 tablets.		
Plumbii, Acetas, Tablets ..	32,380 lbs.		
Potassii, Chloras	14,296 lbs.		

LIST OF PRINCIPAL MEDICINES, ETC.—*Continued.*

Hampers, various	554	Knives, Searching, Pocket, Folding	279
Jars, Stone Packing, various..	27,352	Knives, Siding	400
Kegs, Packing, various	15,091	Knives, Symes	1,116
Tins, assorted, packing	124,149	Knives, Foot, in Leather Case	52
Nails	2,841 lbs.	Labels, Plain, Gummed	197,262
Paper Bags, Packing	2,677 lbs.	Labels, Printed, Gummed	44,495
Paper, Corrugated Packing ..	5,832 lbs.	Lamps, Spirit, Glass	148
Plaster of Paris	2,194 lbs.	Lamps, Singeing	775
Sacks	16,757	Lines, Side	911
Straw	30 tons 18 cwt. 2 qrs.	Measures, Enamelled Iron	1,076
Timber	7,766 R. feet.	Machines, Centrifugal, complete	157
Tow, Jute	15,512 lbs.	Machines, Centrifugal, Glass	7,262
Twine, Packing	1,983 lbs.	Measures, Glass	1,971
Bistouries Probe Pointed	2,015	Measures, Aluminium	8,837
Bistouries Sharp Pointed	485	Mortars, Compo.	778
Bottles, Dispensing	16,362	Mortars, Glass	211
Brushes, Camel Hair	3,407	Microscope, Large, with diagnostic outfit	12
Brushes, Nail	550	Microscope, Small, complete	251
Buttons, Suture	526	Microscope, Cover Glasses for	25½ lbs.
Cases, Pocket Instrument, complete	864	Microscope, Glass Slides for	25,749
Cases, Caustic	297	Microscope Needles (Packets of 25)	114
Cases, Dissecting Metal, complete	1,935	Microscope Needles, Holders for	279
Cases, Needles, Silk and Tape	9,569	Microscope Watch Glasses for	240
Cases, Post-mortem, Leather, complete	411	Microscope Stains	1,187
Catheters	926	Mirror, Nasal, with Handle	302
Clippers, Horse	293	Muzzle, Chloroform	238
Cradles	818	Needles, Exploring	281
Curettes	337	Needles, Seton	408
Director, Steel	162	Needles, Suture	21,924
Director with Scoop	185	Needles, Suture, Vulcanite	307
Dredgers, Powder	307	Needles, Post-mortem	144
Dredgers, Powder, Boric Acid	901	Pestles Compo.	743
Douches, Irrigation, Set of 4 complete	132	Pestles, Glass	199
Douches, Irrigation, for Limbs, "Pages"	83	Pails, Aseptic	766
Drenching Horns	254	Pails, Fomenting	526
Drenching Tins	2,125	Probes, Metal	7,071
Ecraseurs	104	Probes, Whalebone	588
Enema Pump, complete	3,010	Rasps, Tooth, complete	5,553
Forceps, Artery, "Bulldog"	6,441	Rasps, Tooth, Plates for	14,148
Forceps, Artery, "Spencer Wells"	2,673	Rasps, Tooth, Rotary	49
Forceps, Artery, Torsion	50	Razors	349
Forceps, Bone, Curved	113	Sanderack Instruments, Clamps for	1,692
Forceps, Bullet	1,876	Saws, Post-mortem	75
Forceps, Dissecting	8,452	Scales, Grain and Weights	414 sets.
Forceps, Dressing	1,768	Scales, 4 oz. and Weights	504 sets.
Forceps, Necrosis	53	Scalpels, Aseptic	11,226
Forceps, Pincutting	238	Scissors	26,519 pairs.
Funnels, Enamelled Iron	526	Scoop, Volkmanns	162
Gags, Mouth	2,965	Spirit Containers, Copper	8,524
Gallipots	19,061	Spray, Eye	175
Gimlets, Surgical	134	Slabs, Ointment, Copper	1,646
Gloves, Post-mortem, I.R.	1,122 pairs	Slabs, Ointment, Porcelain	377
Guns, Balling	2,012	Spatulas	2,593
Hones	323	Steels	224
Hobbles	316	Sterilizer with Lamp and Stand	108
Insufflator, Nasal	106	Stethoscope, Binaural Phonograph	124
Irons, Firing, Budding	230	Strops, Razor	82
Irons, Firing, Common	448	Syringes, Brass	5,452
Irons, Firing, Pyro-puncture	113	Syringes, Brass, Nozzles for	14,555
Jugs, Enamelled Iron	380	Syringes, Brass, Hypo.	12,245
Knives, Butchers	567	Syringes, Brass, Hypo., Needles for	35,123
Knives, French (Set of 6)	119	Thermometers, Clinical	142,105
Knives, Searching	7,738	Trays for Disinfecting Instruments	866
		Trepelines	706
		Trocars and Canulas	2,135
		Tubes, Tracheotomy	2,239
		Tubes, Test, Nests of 3	1,359 nests.
		Tubes, Test, various	6,927
		Wire, Suture	715 hanks and reels.

LIST OF PRINCIPAL MEDICINES, ETC.—*Continued.*

Basins, Hand	1,586	Pins, ordinary	562 sheets
Bottles, Mixing, complete ..	3,432	Pins, safety	2,422 boxes.
Bottles for Chest and Pannier	31,436		
Bottles for Iodine, complete ..	24,137		
Cases, Metal, for Instruments	1,314	Army Book 32	2,648
Cases, Tin, for Compressed		Army Book 153	3,366
Drugs	1,579	Army Form A.2000	24,663
Chests, Veterinary Field Unit,		Army Form G.994, Books of ..	1,845
complete	33,683		
Chests, Veterinary Field Unit,		Envelopes, Note	42,273
empty	29,024	Envelopes, Foolscap	8,100
Chests, Veterinary Officers' ..	1,823		
Chests, Veterinary Officers',		Pencils, Indelible	11,192
empty	1,559		
Padlocks	3,675	Wallets, Officers', Regular,	
Padlocks, Keys for	3,820	complete	1,770
		Wallets, Veterinary, Mark III.	8,198

II.

LIST OF INSTRUMENTS, ETC., REPAIRED IN REPAIR WORKSHOP FROM
1ST APRIL, 1920, TO 31ST DECEMBER, 1922.

Name of Instrument, etc.	Total No. Repaired	Name of Instrument, etc.	Total No. Repaired
Aspirators	1	Enema, Pump, Rectum,	
Auto Cauteries	34	Pipe for	2
Bandages, Winder	12	Forceps, Artery, Bulldog ..	53
Bistoury, Caché	3	Forceps, Artery, Spencer	
Bistoury, P.P.	70	Wls.	1
Bistoury, S.P.	38	Forceps, Artery Torsion ..	44
Cabinets, Glass	1	Forceps, Bone, angular ..	9
Cabinets, Glass, small	10	Forceps, Bone, curved	41
Cases, Dissecting, Metal	24	Forceps, Bone, straight	13
Cases, Dissecting, Metal	20	Forceps, Bullet	43
Cases, Minor Operation	2	Forceps, Dental, large	2
Cases for Pocket Instru-		Forceps, Dental, small	3
ments	9	Forceps, Dental, w/o handles	2
Cases, Leather, P.M.	21	Forceps, Dental, handles for	1
Cases, P.M., SvH. pattern	1	Forceps, Dissecting	99
Catheter, Female, Metal	1	Forceps, Dressing	17
Catheter, Male, w/o Stilette	1	Forceps, Necrosis	24
Chisels, Tooth	1	Forceps, Pincutting	48
Clams, Castrating	19	Forceps, Nilsellem	7
Cradles	10	Funnels, Enamelled Iron ..	11
Curettes	97	Gags, Mouth	3
Cystoscope, Electric (c)	1	Gimlets, Surgical	12
Director, Steel	40	Handles, Seton Needle	23
Director with Scoop	24	Hobbles, A Piece	7
Douches, Irrig., Japanned		Hobbles, B Piece	9
Nest of 4	29	Hobbles, C Piece	6
Douches, Irrig., Japanned		Hoof Plane	1
single	7	Hooks, Dissecting (3)	1
Dredgers, Boric Acid	10	Hooks, Tumour	4
Ecraseurs, Butlers, Ovariety	11	Infusion Apparatus (c)	10
Ecraseurs, Dewars	10	Irons, Firing, Budding	8
Ecraseurs, Chains for	7	Irons, Firing, Common	11
Enema, Pump, large, com-		Irons, Firing, Pyro-Punct.	4
plete	6	Jugs, Enamelled, 6-pints ..	26
Enema, Pump, small	38	Jugs, Enamelled, 3-pints ..	7

Name of Instrument, etc.	Total No. Repaired	Name of Instrument, etc.	Total No. Repaired
Knives, Butchers	3	Sandcrack Instruments,	
Knives, Eye	11	Forceps	1
Knives, Foot, in Leather		Sandcrack Instruments,	
Case	7	Irons	1
Knives, Guarded, Embryoty	9	Saws, Post-mortem ..	19
Knives, Hoof, black handles	10	Saws, Sidebone	1
Knives, Hoof, French (sets)	33	Scales, 7 lbs., complete sets	2
Knives, Ronette	2	Scales and Weights, 1 and	
Knives, Searching	74	2 lb. sets	3
Knives, Searching, Pocket	2	Scalpels, Aseptic, handles..	196
Knives, Siding	21	Scissors, Dressing, curved	157
Knives, Symes	44	Scissors, Dressing, straight	3
Lamps, Dental Electric		Scissors, Rowelling ..	10
(without Battery)	3	Scissors, Trimming, curved	40
Lamps, Spirit, Glass	1	Scoop, Volkmann's ..	63
Lamps, Spirit, Brass	1	Spatulas	129
Lamps for Sterilizer	1	Stand, Test, Urine, complete	1
Lancets	13	Sterilizer with Lamps and	
Machines, Centrifugal, com-		Stand	2
plete	17	Sterilizer, Tin and E.I. ..	1
Measures, Fl. 20 oz.	6	Swabbers, Metal	3
Microscope, Travelling ..	6	Syringe, Brass, 3 oz. ..	8
Microscope Fittings, Mechan.		Syringe, Brass Nozzles, Bone	
Stages	1	for	4
Microscopes, Fittings,		Syringe, Hypo., 30 c.c. ..	3
Mirrors	1	Syringe Hypo., 5 c.c. ..	8
Microscopes, Fittings, Needle		Syringe, Hypo., 1 c.c. ..	6
Holders for 12		Syringe, Hypo., special ..	4
Nail Pullers	4	Syringe, Hypo, Needles for	403
Needles, Aneurism	1	Tenaculums	2
Needles, Exploring	12	Tooth Shears	3
Needles, Neurotomy	2	Tooth Shears, without	
Needles, Seton	164	handles	8
Needles, Seton, Cases of ..	1	Tooth Shears, Handles for	1
Needles, Suture	48	Trays for Disinfecting	
Needles, Suture and Holder	2	Instruments	37
Ophthalmoscope, Electric		Trephines, large and small	42
(without Battery)	5	Trocar, Cattle	12
Pestles, Composition	3	Trocar, Exploring	1
Probes, Metal	295	Trocar and Canula	238
Probes, Whalebone	3	Trocar McDoweels	6
Rasps, Tooth, complete ..	24	Trocar, and Canula (Nests	
Rasps, Tooth, Rotary (c) ..	10	of 4), Nests	2
Razors	30	Tubes, Lighting, Electric,	
Retractors, Aseptic	7	without Battery	5
Retractors, Eyelid	18	Tubes, Tracheotomy ..	30
Roaring Instruments,		Trays, Copper, Tinned,	
Forceps, Dental	10	Nests of 4	1
Roaring Instruments,			
Forceps, Short	22	Total Instruments, etc.,	
Roaring Instruments,		Repaired	3,518
Knives, Hobdays	13		

III.

CONTENTS OF FIELD VETERINARY CHEST, "OFFICERS."

TOP TRAY.

Pins, safety, 1 box.	Tube, Tracheo- tomy.	1 Tooth Rasp.	1 Ball Twine.
Syringe Hypo : 1 c.c.		1 Pump Enema in	1 Gag, mouth.
Syringe Hypo : 5 c.c.		canvas bag.	1 A.B. No. 32 Case
Syringe, brass, 3 oz., without nozzles.		1 Ligature Case.	Book.
1 Case, dissecting, containing 3 Scalpels. 1 Symes Knife.		1 Measure, E.I.	1 Book Indent
1 Forceps, dissecting.		2 oz.	Forms.
1 Case, dressing, containing 1 pair Scissors, 2 Ther- dressing, 6 in. mometers.		1 Case, containing	
1 Bistoury P.P. 1 Trocar and		1 Probe, metal, 6 in.	2 Reels Silk Ligature
4 Bulldog Artery Canula.		1 Probe, metal, 10 in.	1 Piece Tape.
Forceps. 2 Nozzles,		1 Forceps, Bullet.	4 Indelible Pencils.
2 Nozzles, bone. metal.		1 Spatula.	1 Tube, 6 Chloral Hydrate Balls.

BOTTOM OF CHEST.

2 Tins Ammon. Carb. Balls	1 tin Plumbi Acet., 5 oz.	4 Tubes	1 tin Mallein,
46 Bandages.	1 tin Acid, Boric, 5 oz.	Paraf.	12 doses.
25 Envelopes.	1 tin Zinc Sulph. 5 oz.	Molle.	2 lb. Wool
12 A.F. A.2000.	1 tin Compd. Drugs.*		2 Triangular
1 A.B. 153.	1 tin Iodi Powder, tubes.	2 Tubes	Bandages.
1 Slab, Ointment	2 tins Aloetic Balls.	Hyd.	2 oz. Medicated
	1 tube Hyd. Sub. Chlor.	Perchlor.	Tow.
	1 flask Spirit.	Tabs.	1 pkt. Gauze.
	1 bottle for Iodine in Case.		

* 4 Tubes containing 12 tabs. each, Arecoline, Cocaine, Morphine Tartrate, Strychnine, and 1 tube containing 25 tabs. Adrenaline.

IV.

CONTENTS OF VETERINARY OFFICER'S WALLET.

- 1 A.B. 153 and Pencil.
- 1 Case, containing Comp® Drugs in vulcanite tubes, and 2 mixing bottles.
- 1 Hypodermic Syringe, 5 c.c., in case, with 4 needles.
- Comp® Drugs : Arecoline.
- Adrenalin.
- Cocaine.
- Morphine Tartrate.
- Strychnine.
- 1 Case Instruments, containing :
 - 1 Symes Knife.
 - 1 Scalpel.
 - 2 Forceps Artery, S.W.
 - 1 Probe and Director combined.
 - 1 Dressing Scissors.
 - 1 Thermometer.
 - Needles and Silk.

V.

CONTENTS OF FIELD VETERINARY CHEST—UNIT PATTERN.

SPACE A. Bandages, 3 in. 48 Chloral Hy- drate Balls, 3 tubes of 6.	SPACE C. 5 ozs. Sulphate of Zinc. 18 gr. tabloids.* 6 ozs. Acetate of Lead. 18 gr. tabloids.* 4 × 1 oz. pkts. Medicated Lint. 4 Tins Ammon. Carb. Balls, each containing 6 × 4 drachm Balls.	SPACE B. Bandages, 3 in. 20 Wool, Absor- bent, 1 oz. pkts, 32 1 Tin contain- ing 20 Tubes Iodine Pow- der, each tube contain- ing sufficient powder to make 1 oz. of Tincture.
	SPACE D. Carbolic Soap in tin. 6 Physic Balls (4 drachms) in tin. Hemp in tin. 5 ounces Boric Powder in tin. 7 ounces Boric Vaseline in tin. 2 Thermometers in wood holder.	
	SPACE E. 4 ounces Perchloride of Mercury tabloids. Spts. Methylatus, 20 ounces. Lysol, 8 ounces. Tow Carbolised .. ounces 12. 1 Bottle for Iodine in tin case.	

On top of D is a tray to hold solutions for dressing wounds. This tray, when full, holds one quart.

Instructions for Use.

* Crush a tabloid and dissolve in 2 ounces of water.

To make White Lotion, dissolve one tabloid of zinc, and one of lead, each in 2 ounces of water, and mix to form 4 ounces of lotion. The strength of this lotion is $1\frac{1}{2}$ drachms of each drug to the pint.

Perchloride of Mercury.—Dissolve one tabloid in one pint of water to make lotion of 1 in 1,000.

Lysol.—Half an ounce to one pint of water makes a solution of 1 in 40 for wounds.

Chloral Hydrate.—Dose one ounce, to be given for colic, and not to be repeated within an hour.

Pierce one end of the ball before giving it to make sure of its dissolving rapidly.

APPENDIX B.

TECHNICAL PAMPHLETS ISSUED DURING THE WAR.

I.

SERJEANTS A.V.C. ATTACHED FOR VETERINARY DUTIES TO UNITS AND FORMATIONS OTHER THAN A.V.C. UNITS.

A.—Discipline, etc.

A.V.C. personnel attached to Units are so attached for discipline, pay, rations, etc., and for veterinary duties.

They are under the military command of the Commanding Officer of the unit.

They will conform with all orders regarding discipline, dress, etc., in force in the unit.

Unless in cases of emergency and as a military necessity they will not be detailed for other than veterinary duties.

They will be directly under the control, and at the disposal of the veterinary officer i/c.

They will proceed to the unit to which they are to be attached, completely clothed, equipped and armed. Renewals of clothing, etc., will be obtained through the accounts of such unit.

They will be supplied with a horse and saddlery by the unit to which they are attached, when the use of such is certified by the C.O. to be necessary.

They will come on the unit roster for leave.

Application for leave, backed by the sanction of the V.O. i/c, must be made to the C.O. of the unit.

They will live with the headquarters of the unit or formation to which they are attached.

They will at all times acquaint themselves with the address of the V.O. i/c.

They will, in the event of a change of billets or camp, at once inform the V.O. i/c the unit of their new address, and the whereabouts of the horse-lines of the unit they are attached to.

When temporarily absent from headquarters on duty, or otherwise, they will leave word with the N.C.O. on duty at headquarters where they are to be found.

B.—Posting.

A.V.C. personnel are attached to units other than A.V.C. units for veterinary duties. On posting, they will be appointed to the acting rank of serjeant. A report on their abilities and suitability to continue to hold the appointment will be rendered by the V.O. i/c to the Officer i/c Base Records, through the A.D.V.S. of the Division or D.D.V.S. of the formation, as the case may be, within one month of the date of their first appointment. If suitable, they will be appointed to the paid acting rank of serjeant (from the date of their posting) while employed for veterinary duties with a unit other than A.V.C. On vacating such appointment, or re-posting to an A.V.C. unit, they will revert to their permanent grade.

C.—Documents.

On posting of acting serjeants to a unit other than an A.V.C. unit, the following documents will be sent by the officer holding them to the O.C. such unit. If such serjeants become casualties, the O.C. the unit will forward the documents in question to the Officer i/c Base Records, A.V.C.

A copy of the Unit, Part 2, Orders affecting A.V.C. personnel will in all cases be sent to the Officer i/c Base Records, A.V.C.

Documents.—Army Forms B 103 and B 122.

D.—Veterinary Duties.

(1) *On Posting.*—They will take over charge of all veterinary equipment of the unit, of the unit case books, and control of sick-lines, reporting forthwith any deficiencies or irregularities existing on taking over to the V.O. i/c.

(2) *General.*—Under the C.O. the unit they are responsible :—

(a) For the discipline maintained in unit sick-lines. (Men detailed for duty therein should be directly under their command while so employed.)

(b) For the sanitation and stable management of all unit sick-lines. (Such lines should be an example in good stable management.)

(c) For the prompt, careful and economic treatment and dressing of all sick and injured animals of the unit. (An animal reported sick comes under their charge and remains under their charge, whether in camp or on the line of march, until discharged to duty by the V.O. i/c, or until it is destroyed, dies, or is evacuated to a Mobile Section.)

(d) For the orderly movement of sick and injured animals on the line of march. (The greatest care should be taken to avoid blocking roads or in any way interfering with military operations or movements.)

(e) For the prompt evacuation to a Mobile Section, properly labelled and accompanied by a complete and correct descriptive roll, of all sick and injured animals ordered to be evacuated by the V.O. i/c. (In exceptional circumstances, e.g. when engaged in a pursuit or retirement, *if the V.O. i/c is not available*, serjeants, A.V.C., must use their own judgment what animals to evacuate, but no animals so injured or ill as to be a hindrance to mobility or not likely to be at work again in *a few days*, should, *in these circumstances* be retained with the unit.)

(f) For the upkeep of unit case books, and a careful record and description of all animals of the unit evacuated, left with civil authorities, died, or destroyed.

(g) That when sick or injured animals are left with civil authorities the prescribed form is also left, and that the V.O. i/c is immediately and correctly informed of the *full* name and address of the civil authority, and a description of the animals in question.

(h) That indents are prepared, for the signature of the V.O. i/c, on A.F. G 997, for all veterinary instruments and drugs required, in ample time to permit of their receipt before the stock in hand becomes exhausted.

(3) *On Relief.*—On vacating appointment: serjeants, A.V.C., on posting from a unit other than an A.V.C. unit will hand over all veterinary equipment of the unit and all case books to the A.V.C. serjeants relieving them. If no serjeant, A.V.C., has arrived prior to their departure, they will hand over such equipment and books to a N.C.O. appointed by the O.C. the unit.

E.—Objective.

Serjeants, A.V.C., attached to units will bear in mind at all times that the keeping of animals of a field unit efficient and in good hard-working condition is of much greater value than waiting until they become sick or injured and then treating them.

Their aim must be to assist in every way in their power and with the greatest of tact in eliminating stable management errors, in preventing the introduction or spread of contagious and infectious disease and in *promptly* relieving fighting troops of the hindrance of sick and lame (ineffective) animals.

This aim can only be attained by constant watchfulness.

When for instance a battery of R.F.A. is actively engaged in field operations, and practically all effective combatant officers and N.C.Os. are with the guns, the serjeant, A.V.C., should remain continuously with the wagon line and, by constant endeavour, ensure, in the absence of a superior officer, that attention to the horses is complete in every respect.

Only by work of this kind can a serjeant, A.V.C., justify his appointment.

The serjeant, A.V.C., can render great assistance on occasions as instanced above, in advising as regards watering, feeding, etc., matters of more importance than veterinary duties of a medical or surgical nature.

The motto "Prevention is better than cure" should be always in his mind and be reflected in his actions.

Unless on duty visiting detachments, they will attend morning, midday and evening stables. They will advise in regard to watering, feeding, exercising, handling, picketing, etc., and will inspect daily all animals of the Units to which they are attached.

They will report to the V.O. i/c, when he visits the unit, all cases of injury or sickness.

When serious cases of illness or injury occur, or in cases of contagious disease, they will report forthwith to the V.O. i/c, communicating with him by messenger, telephone, or telegraph, whichever may be the quickest, meanwhile taking all necessary steps to render first-aid. In cases of contagious or infectious disease, they will isolate the animal or animals and, where necessary, also isolate in-contacts, and isolate and disinfect harness, saddlery, blankets and standings. Further, they should in such cases endeavour to trace the source of contagion.

They must at all times promptly obey the orders of a superior officer. Where they consider such an order is wrongly given they can make a statement or complaint to their Commanding Officer or to the V.O. i/c *after* complying therewith.

F.—Notes.

(1) Common faults in veterinary treatment:—

(a) Failure to institute a regular system in units of reporting sick animals before they become seriously affected.

(b) Failure to take *thorough* and effective measures of isolation in all cases of serious infectious and contagious disease.

(c) Failure to evacuate to mobile sections all serious cases. The retaining for treatment in unit sick-lines of serious and semi-serious cases interferes with the immediate mobility of the unit. Such cases would be much more economically treated in veterinary hospitals.

(d) Failure of serjeants, A.V.C., to report to the V.O. i/c all fresh cases.

(e) Bad sanitation (dirty condition) of sick-lines.

(f) Over-feeding of patients.

(g) Under-exercising of patients.

(h) The abuse of water in washing wounds. The use of dirty or infected water is a constant source of infection of "clean" (aseptic) wounds.

(i) The use of dirty or infected scissors and other instruments.

(j) The filthy condition that veterinary dressings, etc., are allowed to get into by leaving them uncovered in the open or in buildings when not in use.

(k) The condition of dressers' hands and nails. The use of soap, water, and a nail brush by dressers would materially help in treating wounds.

(2) Common faults in stable management:—

(a) *Lines*.—Too crowded; breast ropes too slack; unnecessary destruction of trees by using them as supports; neglecting to prepare for bad weather by draining and making hard-surface standings; crowding kickers among other animals (a source of 20 per cent. of all preventable injuries); using short stakes and head ropes to picket animals (a source of over 65 per cent. of all preventable injuries); crowding horses into indifferent or insanitary, sometimes disease-infected, stables, barns or even hen-houses; absolute or partial neglect of lines, sanitation. (Units appear to forget it is almost certain that another unit will have to take over their filthy lines.)

(b) *Watering*.—Too fast a pace to and from; indifferent or no supervision at; men remain mounted for long periods waiting their turn to water; girths unslacked and bits left in the mouth while watering; large watering parties on public roads with nothing but head ropes to control horses by; watering by riding into ponds or streams, with the result that the horses

drink liquid mud and foul every other watering place down stream ; want of good watering stable management is the direct cause of the majority of cases of poverty among animals in a Field Army.

(c) *Exercising*.—Too little of, when unit stationary ; far too fast a pace at, (frequently while the head of an exercising party is apparently proceeding at a reasonable pace the rear is alternately halting and galloping) ; indifferent or no supervision at, (an officer or N.C.O. in charge of an exercising party can only exercise supervision when in the rear or wide to a flank, yet he generally rides at the head).

(d) *Grooming*.—Sometimes neglected ; excuses as to inability to obtain grooming kit from Ordnance do not hold water nine times in ten. Investigation generally shows they have not, or only recently have, been indented for. Indifferent grooming is the indirect cause of most skin diseases and all lice.

(e) *Feeding*.—Great waste of forage, particularly hay ; nose bags and hay nets should invariably be used when animals are fed in the open—nothing excuses the waste caused by feeding off the ground ; irregular feeding hours ; feeds not taken with horses on long marches ; musty and bad hay deliberately fed to animals to save the trouble of making a complaint ; fancy feeding with beet, molasses, young wheat, etc., etc. (while useful in the case of sick or debilitated horses, unnecessary and contra-indicated for efficient horses with field units).

(f) *Want of stable or line supervision*.—Line guards posted as a matter of form and with no definite orders ; when orders given they are not enforced ; absence of an officer or even a senior N.C.O. from stables, particularly early morning stables ; nearly 50 per cent. of all casualties, i.e., all horses on the sick list from any cause whatever, are due to preventable disease and injury resulting from the above common stable management faults.

(g) *Harness*.—A frequent cause of debility in active operations is bit-injury and the principal cause of the latter is an ill-fitting bridle that allows the bit to hang too low in the mouth. A new bridle may fit well when first taken into use, but after a few days or weeks the leather straightens out and elongates with the consequence that the bit if not readjusted descends too low in the mouth. Another reason for descent of the bit is wasting of flesh over the poll so that the bridle becomes too large for the head.

The result in either case is the same, a more or less severe bit injury leading rapidly, unless the cause is removed, to loss of condition from interference with mastication. Serjeants, A.V.C., should give attention to this matter, as, if taken in time, readjustment of the bit will prevent spreading of the injury.

II.

HORSE MANAGEMENT AND ITS RELATION TO PREVENTIVE VETERINARY MEDICINE.

Much has been said and written concerning veterinary preventive medicine, but it is not sufficiently realized that the basis of veterinary medicine from a military standpoint consists in horse management. Just as antisepsis is steadily giving place to asepsis, so must the care of horses in health supersede their treatment in disease if we are to attain perfection.

The commander of a brigade of field artillery or a cavalry regiment, who is by nature and inclination a good and keen horse-master, is of greater economic value to the State in this respect than an executive veterinary officer who is merely a physician and surgeon.

The economic value of the executive veterinary officer to the State lies principally in his recognition of, and active interest in horse management in garrison, in camp, and in the field. It is better by active interference and thick-skinned insistence to keep one horse in good condition, and therefore

to fortify the resistance of that horse to disease, than to restore to health two evacuated to veterinary hospitals. Theoretically, officers commanding mounted combatant units are responsible for the horse management of their animals, but actually they are frequently unable to give proper attention to the matter by reason of their combatant duties.

It is, therefore, the veterinary officer upon whom the moral responsibility ultimately devolves. It is the veterinary officer who must have a keen eye to the care of all animals of units in his veterinary charge in respect of watering, feeding, picketing, and the many other primary essentials of horse management, whereby strength is maintained and injuries are obviated. It is undoubted that in the past veterinary surgeons have inclined too much to the ultra professional attitude. They have in many instances lost prestige in the eyes of intelligent laymen by reason of their lack of interest in, and often actual ignorance of, the practice of horse management.

The word practice is used advisedly, because a man may be well versed in the principles without being able to put them into practice.

For example, he may be thoroughly conversant with the necessary nitrogenous ratio of the daily ration, and yet not be able to advise how it should be distributed throughout the day. Moreover, he is too frequently satisfied to know what should be done, and too often not interested to find out what actually is done. There is probably no class of individual less learned in the pure science of feeding than a trainer of racehorses, yet it will be admitted that these men are, above the majority of men, competent to keep horses in good condition. The reason of this phenomenon is that there cannot be elaborated a scientific method of feeding horses and mules which will at the same time provide for idiosyncracies in individual animals, and correct the misdeeds of subordinates. Briefly, the empiricist who sees that his horses *do* get the feeds he empirically ordains, is to be preferred to the scientist who, having elaborated his ratios, concerns himself no further in the matter. Scales of forage may be multiplied and varied *ad infinitum*, but it is, after all, only the food and water the animal actually consumes that affects his condition from a dietetic point of view.

The mention of water in the last sentence raises an important point. A fellow feeling prompts the kindly soldier to feed his horse, but the same feeling does not obtain to the same extent with regard to watering.

To the unintelligent human mind the immediate need of the horse for draughts of water from stream or pond is not so readily apparent as the need for food. Yet condition is dependent more upon frequent and abundant water than upon food.

It is the duty of the veterinary officer to press this point home, and to insist that horses get their due quantum of water whenever and wherever possible.

It is, therefore, no light task that must be undertaken by the executive veterinary officer, if he would justify to the full his employment by the State, as a measure of economy. He must be ever on the alert, ever ready to censure and criticize friends and foes alike, when he perceives defective stable management. He must lose no opportunity to preach the word of horse management.

When he is unable to effect improvement by these means he must be ruthless in bringing delinquencies to the notice of higher authorities. Veterinary officers should be in effect the police of animal sanitation. By virtue of their training and opportunities they alone are properly qualified to act on behalf of the State in bringing to notice sins of omission and of commission, adversely affecting the health of army animals.

The veterinary officer, when he discovers neglect and ill-usage of animals, should not as a rule, however, forthwith resort to disciplinary representation. He should recognize that the neglect may well be the result of ignorance. Logical explanation and exhortation will often produce the desired effect, and each convert that he can thus make strengthens the chain of preventive medicine.

The following simple instances are cited in which veterinary officers can exert themselves usefully :—

- (1) A driver of artillery is seen mercilessly " chucking " his horse in the mouth.

Action required, as this habit is a fertile cause of bit injuries.

- (2) A party of men with horses are halted not far from a stream. The men are interested in their own occupations, the bits are in the horses' mouths, and no attempt has been made to water or feed the horses.

Action required to ensure attention to the horses. Action should include enquiry as to unit, and whereabouts of the nearest officer of such unit, to whom the matter should be duly reported.

- (3) A man is observed galloping his horse along a road at a time when it is unlikely that he will be the bearer of an important military message.

Action—Stop the man, and, failing a satisfactory explanation, report him to his commanding officer.

- (4) A line of horses are seen picketed along a hedge. The stable guards are evidently neglecting their duty. Here a horse has got his legs over the headrope. Another horse has shaken off his nosebag, from which the contents are escaping and are being trampled in the mud. Many horses are tied up with too much rope, and at least one horse is loose.

Action—Report the matter to the responsible officer.

- (5) A man is riding on the line of march with a steady stream of oats trickling from his nosebag.

Action—obvious.

- (6) A man is observed to have a nosebag of distended and irregular bulk.

Action—Request that the nosebag be opened, when it will not unusually be found that the contents pertain to the man rather than to the horse. Enquire into the matter, and if it be found that the man should be carrying a feed of oats, report the fact to his commanding officer, informing him of the alien contents of the bag.

The above are only a few instances of the innumerable ways in which a veterinary officer may take useful action.

It has been established that no less than 50 per cent. of the casualties among animals occurring in divisions of the British Expeditionary Force, under present conditions, are attributable to preventable causes. Surely here is sufficient scope for useful activity. No need to hanker dreamily after opportunities for higher scientific research when such vast opportunities for preventive medicine in its widest sense are available to the man of energy and courageous common sense. Moreover, what can be more truly scientific than thus striving to attack disease at its source. It may be thought that the foregoing remarks are of a platitudinous nature, and doubtless they are in that they are simple truths. Unfortunately, however, simple truths and elementary axioms are, by virtue of their simplicity, too frequently overlooked and lost to sight, submerged by professionalism that has ever been the curse of clear-sighted fundamental science.

It is, however, not intended to discourage the more complex scientific side of military veterinary work which may, and should, proceed in veterinary hospitals and in laboratories in which such work can legitimately be carried on without prejudice to the greater need that exists under regimental conditions for purely preventive medicine.

It has been considered advisable, in order to illustrate more fully the foregoing remarks, to append practically in full the subject matter of a pamphlet, compiled by the Assistant Director of Veterinary Services, 1st Division, which was subsequently adopted by the First Army, British

Expeditionary Force, as an official handbook for the guidance of transport officers.

Although intended for transport officers, there is hardly a point in the pamphlet that will not at some time or other require the personal attention of the zealous veterinary officer if he is to fulfil his important responsibility.

HORSE MANAGEMENT (IN THE FIELD).

Applicable to :—

Wagon Line, R.A.
Field Cos., R.E.
Regimental Transport.
Divisional Train.
Field Ambulances.
Mobile Vety. Sec.

A.—Duties of an Officer or N.C.O. in Charge Wagon Line :—

1. He is responsible for the "detailing" of all regimental transport, therefore, unless transport animals are to be over or unevenly worked, a system of detailing transport duties daily should be introduced, otherwise wagons are called out at all odd hours, unnecessarily interfering with feeding, watering, and stables.

Frequently, too, a wagon is sent out over the same road in the afternoon as in the morning, to cart very small loads that could easily have been carted on the same journey, provided such transport had been called for through a central regimental authority and not by individual officers.

2. He is responsible for the condition of his horses and for all matters that affect their utility. To retain animals in good condition it is necessary that :—

- (a) As far as possible a regular stable routine be carried out. (When stationary this is always possible.)
- (b) The quantity of forage admissible per horse is drawn and expended without waste.
- (c) All harness is kept in a serviceable state and fitted to the animal carrying it.
- (d) The shoeing of the animals in his charge is kept up to date. (This is a most important matter).
- (e) The vehicles in his charge are kept in a serviceable order, and that no undue "drag" is caused by clogged or fired axle boxes.
- (f) The sick and injured rate of his horses is kept low. (Again a very important matter.) He should impress on his men the necessity for individual care of their charges, see that they use common sense, for instance in picketing apart a known kicker. He should arrange with the V.O. in veterinary charge of his unit that he, or if he is unavoidably absent, one of his reliable N.C.Os. will be present when the V.O. comes round, and that his (the V.O.'s) advice on any matters of stable management are considered. Both he and his N.C.Os. should know the whereabouts of the V.O.'s headquarters. The V.O. should invariably be informed of any move of wagon lines. He should issue such instructions as to render it impossible for remounts, captured animals, or strays to be brought into his stables or horse lines until inspected by his V.O. and passed healthy. (Until so passed such animals should be picketed apart.) He should see that no sick or lame animals are left without veterinary attention. Once an animal has been put on the sick list by a V.O., the V.O. is responsible for its treatment, evacuation, or destruction, and until such animal is returned to duty no steps should be taken as to its disposal without instructions from the V.O., or, if in an emergency, such steps are taken, the V.O. must as soon as possible be informed. The disposal of horses, fit or sick, by sale or handing to farmers is strictly prohibited.

B.—Notes on Selection of Open Standings :—

The following points should be looked for :—

1. Accessibility to water supply.
2. Soil. Hard made ground is most suitable, clay least suitable.
3. Drainage. A gentle slope is best, a flat poor, a hollow bad.
4. Shelter. A thick hedge or wall to windward of lines gives better shelter than trees. Shelter from view is frequently necessary, however, and trees should therefore be made use of where necessary.
5. Lines. It is always preferable to erect some form of horse lines than it is to tie animals here and there to wagons and trees, supervision is much easier, a more rapid "move off" possible, and the orderly appearance greatly helps discipline among the transport personnel. A breast line is preferable to a ground line. If trees be used to support breast lines their bark must first be protected by use of sacking. There is no excuse for the destruction of trees by horses gnawing them. When moving daily, wagons form excellent supports for breast ropes.
6. In allocating standings 5 to 6 feet per horse should be allowed, and arrangements should be made :—

- (a) To picket kickers and biters apart.
- (b) For a separate and somewhat isolated place for shoeing.
- (c) For a similar place for dressing sick and injured animals.
- (d) For a place for storing forage.
- (e) For the removal *daily* of all dung, and the sprinkling of standings with crude kerosine.

Note E.—Any dungheap must be well apart.

- (f) No more horses should be picketed on one length of rope or on any support than such is strong enough to hold fast, in case they are startled and try to stampee.
- (g) No head rope should be longer than, (i) if tied to a breast rope, 3 feet long ; (ii) if tied to a ground rope, straight up and down.
- (h) No horse should be tied to a loose object it can pull away.

C.—Outline of Stable Routine :—

1. *Daybreak*.—Stables. (a) Remove droppings (to a temporary dungheap). (b) Water. Animals should have plenty of watering accommodation, and must not be hurried when drinking, or going to or from watering. (c) Groom. Twenty minutes grooming at this hour is invaluable on service, and makes a difference to a horse physically as a wash does to a man. (d) Clean out feet (most essential). Serjeant-farrier or shoeing-smith should inspect feet of every animal at this hour daily, turning down loose clenches, etc. (e) Feed. On service it is advisable to give a good corn feed daily at this hour, say 4 lb. The giving of hay at this time is optional.

Too much care cannot be given to supervision of watering and feeding. As far as possible, feeds should be portioned out before feeding time, and no animal should be fed until all are ready.

Where no mangers are available nosebags must be used. These should be *properly* adjusted. A stable guard should always be left in the lines during feeding time, indeed at all times a stable guard should be posted. He should replace displaced nosebags, and take off empty ones. An officer should invariably be present at morning stables.

2. *After breakfast*.—Exercise, when animals are not at work.

3. *Midday*.—Stables. (a) Thoroughly clean out standings. Remove dung from temporary pit to some distance from lines. Sprinkle with kerosene. (b) Groom. (c) Water. (d) Feed : corn 3 lb., hay 4 lb. When animals are on line of march, corn feed only may be given. It should be an invariable rule when sending transport out for an indefinite period, to send one corn feed per horse.

4. *Afternoon*.—Clean harness, saddlery, wagons, etc. Examine and, where necessary, oil axles.

5. *Evening*.—Water. Feed : corn 3 lb. (hay 4 lb. if none given at mid-day). Post night piquet, examine all fastenings.

6. *Night* (8 p.m.).—Give remainder of hay feed if any left.

It is impossible to lay down any particular stable hours when on service, as they must necessarily alter with the work done, but when possible the above routine should be insisted on.

The use of hay nets means a considerable saving of hay in windy weather. On all occasions their use is valuable. They keep horses occupied longer with their hay feed, and so keep them out of mischief, and they prevent rogues stealing from their neighbours.

D.—Notes on Line of March Routine :—

1. Have stables (water and feed) at least 1½ hours before hooking in.
2. Arrange that at least one good corn feed per animal is carried on the wagon and easily accessible.
3. Arrange that a bucket per wagon is readily accessible.
4. Arrange that farrier has his wallet on his saddle, and marches in rear of column.
5. Prohibit the hanging of all unauthorized articles on saddle D.
6. Arrange that the loading of all wagons be strictly supervised, and enforce orders against overloading of wagons.
7. Punctuality at rendezvous must be strictly observed.
8. March discipline must be strictly enforced. Want of such is responsible for :—

(a) Overloading wagons by men riding on them or placing rifles and equipment thereon.

(b) Blocking roads through inattention to orders passed along column by word or signal.

(c) Tailing out of column through same inattention, or through drivers not being ready to move off from a temporary halt when ordered to do so.

All this involves undue wear and tear on horseflesh.

9. If marching before dawn, halt after dawn and readjust harness.

10. Enforce orders that all mounted men dismount when column halts (not at momentary checks).

11. The pace of infantry draught is the walk of three miles per hour.

12. Halt well clear of the centre of the road, and leave all cross roads clear.

13. Keep column well to side of road except when road is paved ; then keep on pavé to avoid raising dust.

14. Halt as near mid-day as possible (unless near end of march), water and feed.

To water, remove bits and slacken girths, and when possible unhook. Care must be taken, however, to remove bits, and water column in small sections at a time if possibly subject to fire when watering.

15. On arrival in camp *first care must be* welfare of the horses.

16. Camping on open ground in a strange locality, form horses lines breast high in form of a square, fastening horses inside, utilizing wagons as rope support. This will prevent animals straying.

E.—General Notes :—

1. Discipline among men in wagon lines should be as strictly enforced as in fighting troops.

2. The duties of a stable guard are very important ; their orders should be very clear, and should be strictly enforced.

3. When possible, an officer should be present with all exercising parties and at watering order. In his absence, a *senior* N.C.O. must be present.

4. Horses should invariably proceed to and return from watering at a walk.

5. Horses should always be taken to water with watering bridles or bits, never with head collars only.

6. When possible, avoid leading horses into streams or ponds to water, they only make liquid mud for horses following or further down-stream to drink.

7. Men should invariably be dismounted on arrival at watering place when waiting their turn to water.

8. Bits should be removed and girths slackened before horses are allowed to drink.

9. It cannot be too strongly impressed on all concerned that an adequate supply of water is of as great importance to horses as an adequate supply of food.

10. The officer or senior N.C.O. in charge of an exercising or watering party should ride in rear of party. Without great experience and perfectly trained drivers, he cannot otherwise judge pace, or enforce discipline.

11. Exercising parties practically invariably travel too fast. Frequently one sees the rear file galloping, a serious offence.

12. Never exercise or work infantry draught horses outside a walk.

13. Trotting out on hard roads is worse than cantering on them.

14. Cleanliness of nosebags, watering utensils and bits should be strictly enforced.

15. Unclean stables are a far greater source of illness among horses than open standings, even in bad weather.

16. Do not wait for bad weather before you start draining and making up your standings.

17. Overcrowding prevents horses from resting, and results in dangerous kicking.

18. Draughts are infinitely better than poor ventilation.

19. Cobbled approaches to stables, etc., when slippery, should be sprinkled with ashes or sand, never with *used* bedding or manure.

20. Projecting rails, bolts, etc., in or near the doorways, or in stables, are a fruitful source of injury to horses.

21. If a horse goes suddenly lame, look for a stone or nail in his foot.

22. A horse off his feed is sick.

23. Rope, saddle, and harness galls, kicks and bit injuries, are practically always due to carelessness and neglect, and reflect greatly upon the discipline of the unit concerned.

24. Laminitis and colic are generally due to want of knowledge on the part of those concerned.

25. Debility *may* be the result of overwork and under-feeding, but is generally the result of ignorance and carelessness. When it exists among a big percentage of the horses of a unit doing the same work and receiving the same rations as horses of other units in fair or good condition, no other causes can account for it.

26. Only the exceptional conditions of a rapid advance or retreat can excuse neglect of a more thorough daily cleaning of stables or standings. When evacuated they must be left clean; probably another unit will occupy them.

27. Only the same conditions can possibly excuse neglect of grooming—at the very least twenty minutes to each horse daily.

28. Nothing can excuse neglect to water and feed animals at least three times in the twenty-four hours.

III.

HINTS FOR EXECUTIVE OFFICERS, ARMY VETERINARY CORPS, DOING DUTY WITH DIVISIONAL UNITS IN THE FIELD.

1. *V.O. responsible to.*—Executive veterinary officers attached to brigades or units are under the command of the brigade or unit commander for discipline. They will conform to all regulations regarding billeting, dress, etc., in force in the brigade. Their baggage will not exceed the authorized amount. They will be under the orders of the A.D.V.S. division in regard to all veterinary matters.

2. *Reports.*—Veterinary officers on arrival or departure, whether on posting or on leave, will report arrival or departure to the A.D.V.S. of the division.

3. *Leave.*—Applications for leave will be submitted to brigade headquarters and by brigade headquarters to the division headquarters through the A.D.V.S. of the division.

4. *Quarters.*—Veterinary officers will live at the headquarters of the brigade or unit they are attached to.

5. *Handing over.*—Veterinary officers on taking, or handing, over veterinary charge of a unit will obtain from, or give to, the veterinary officer they relieve, or are relieved by, a copy of the last Army Form A 2000 and the veterinary officer's chest. They will take, or hand, over in person all animals on the sick list at the time of transfer, unless they receive definite orders otherwise.

6. *On posting.*—On posting to a brigade, veterinary officers will make a point of getting into personal touch with commanding officers and regimental transport officers as soon as possible.

7. *A.V.C. serjeants.*—An A.V.C. serjeant is posted to infantry brigades and to each artillery brigade (each battery and ammunition column, New Army). This N.C.O. is at the disposal of the veterinary officer. He is attached to brigade or battery headquarters for discipline, pay, etc. He will live with brigade or battery headquarters. A.V.C. serjeants attached to brigades will visit each unit of the brigade daily, supervising the dressing and treatment of all sick and attend the veterinary officer on his daily round. All cases of sick and injured animals will be reported to the serjeant as soon as possible, and he will report at once to the veterinary officer any serious or urgent cases of sickness or injury and *all* cases of contagious disease. He will keep a notebook and will record therein systematically all cases under treatment, showing date admitted, how case disposed of and date of disposal, also any information necessary for the veterinary officer as well as any instructions issued to him by the veterinary officer. A case book may be kept in lieu of this notebook.

8. *Urgent calls.*—The veterinary officer will instruct all units that when in urgent need of his services they should apply to brigade headquarters, who will thereupon inform the brigade A.V.C. serjeant and the veterinary officer in question.

9. *Other units.*—Veterinary officers will be prompt in rendering attention to emergency cases in their own, or any other unit or formation, when asked to do so. If at any time they consider they have been called unnecessarily to see a trivial case, they can report the matter to the A.D.V.S., but will meanwhile give the necessary attention to the case.

10. *Outline of general duties.*—It cannot be too strongly impressed upon veterinary officers that they are attached to the units of the Field Army with the object, not so much of treating sick and lame animals, as of retaining the animals of their unit in an efficient and serviceable state. This object can only be attained by constant personal supervision. Veterinary officers should, at all times, in all weathers, and all circumstances, be on the outlook for the first symptoms of any contagious or infectious disease, the first signs of any loss of condition, stable management faults that may cause preventable injuries, and for indifferent shoeing. Veterinary officers will make a point of keeping unit and brigade commanders informed of the condition of their horses. It is suggested that a *very short* weekly report to commanding officers would materially assist this object. Loss of condition, or indifferent stable management, viz., bad watering arrangements, want of exercise, insanitary lines, etc., should at once be brought to the notice of the unit commander. If not at once remedied, the fault should be brought to the notice of the brigade commander, and, if necessary, to the notice of the A.D.V.S. of the division. Veterinary officers should carry out their duties tactfully, but must not allow themselves to be dissuaded from doing their duty.

11. *Inspection of animals arriving with or leaving formation.*—Veterinary officers will arrange with headquarters of brigades or formations of which they

are in veterinary charge to be informed at once of any expected arrivals or departures of units to, or from, formations. They will carefully inspect all animals of any such unit and render a report to the A.D.V.S. of the division stating (a) if free from contagious and infectious disease; (b) general condition of animals at time of inspection. In no case will they permit animals suffering from infectious or contagious disease to accompany a unit leaving the formation. Such animals must be evacuated.

12. *Contagious disease.*—Veterinary officers will report at once all cases of contagious disease to the A.D.V.S. by telephone message, or special orderly where necessary. Pending instructions, however, from the A.D.V.S., they will forthwith take the necessary steps to eliminate or control the outbreak, viz., evacuate or destroy the affected animals, destroy or disinfect harness, saddlery and grooming kit, disinfect standings or stables, isolate in-contacts, trace source of infection, and arrange for frequent—daily where possible—inspection of affected units. A report of the outbreak and of the occurrence of fresh cases should always be made to the unit and brigade commanders.

13. *Unit sick lines.*—Veterinary officers will organize in each unit a simple but effective system of veterinary control and care of sick animals. They will form a unit sick lines, into which all sick and injured animals of that unit are sent, and in which they must remain while with their units. They will bear in mind that once an animal is placed on the sick list it comes under their charge and remains there until cured, evacuated, or until it dies or is destroyed. They are responsible that any animal destroyed by the order of the A.D.V.S. or by their own instruction is destroyed in their presence. No horses will be destroyed other than by order of a veterinary officer, with the exception of animals that are palpably incurably injured, even to the eyes of a layman, and that are suffering great pain. In such cases any officer should have authority to authorize the animal's destruction. He must, however, report his action to the veterinary officer. The veterinary officer is responsible for the sick lines and the condition and stable management of the animals therein. The farrier and any dressers attached thereto are under his command while at such duty, and he is responsible that they carry out their work methodically and efficiently. He must exercise great care that all drugs and dressings are economically expended. The condition of the sick lines should be an example to the remainder of the unit in sanitation, grooming, and stable management generally, as well as in discipline. The selection of a site for a sick line should be as carefully made as the military circumstances will permit.

14. *System.*—Veterinary officers must bear in mind that the very many duties they are called upon to perform *in keeping the horses in their veterinary charge efficient and fit* does not permit of their making a practice of operating, of personally dressing injuries and wounds, or of giving very great attention to each individual sick animal. Therefore their system must be to send as soon as possible to the Divisional Mobile Section for evacuation to Line of Communication Veterinary Hospitals all such sick and lame animals, retaining under unit treatment only very minor cases. It is unquestionable that really sick or comparatively severely injured animals are much more economically treated in, and more quickly returned to units from, properly equipped and efficiently staffed Lines of Communication Veterinary Hospitals than would be the case if they were retained under treatment under even the best circumstances attainable with a Field Army.

15. *Incurable cases.*—Veterinary officers must be careful to guard against evacuating animals so seriously injured that their cure, or their value when cured, is very problematic. Such animals only choke up Veterinary Hospitals and prevent the efficient treatment of suitable cases; such animals should be destroyed forthwith.

16. *First aid.*—In all cases prior to evacuating animals to Mobile Sections, injuries must be thoroughly dressed. Veterinary officers cannot pay too great attention to the early treatment of injuries and wounds. The early removal of foreign bodies increases the rapidity of recovery, and where no

foreign bodies exist the rendering aseptic of a septic wound before any marked destruction of tissue has taken place has the same effect. It is suggested that the washing or syringing of wounds with any antiseptic with a water basis is of very doubtful value in the field, on account of the difficulty of supervision and the tendency of dressers to use the first water to hand. The following treatment of injuries and wounds has had the most excellent results, Firstly—The application, without washing and before surgical interference, of tincture of iodine, tincture of iodine and petrol, or petrol alone, to the surface of the wound. Secondly—Removal of dirt, gravel and other foreign bodies. Thirdly—Operative interference where necessary and possible (in which case leave a good dependent drainage). Fourthly—Re-application of antiseptic, where necessary, using a wool-wrapped probe soaked in the disinfectant to reach sinuses and channels. Fifthly—Application of a *thin* layer of dressing (cotton wool). Lastly—Apply a bandage where necessary and possible. When, on account of want of instruments or the circumstances of the moment such treatment is not possible, the case will be treated by the Mobile Section prior to evacuation. Veterinary officers should endeavour, however, thoroughly to dress all cases prior to sending to Mobile Section.

17. *Poultices*.—The use of bran poultices on open wounds in the feet or elsewhere has given bad results and should be discontinued.

18. *Cases left with Civil Authorities*.—Serious cases that cannot be immediately evacuated on account of their inability to travel should be dealt with as follows:—

- (a) If the unit is stationary—retained until able to move.
- (b) If the unit is moving inside a divisional area—handed over to the unit relieving them, which unit will evacuate the animals in due course.
- (c) If the unit is leaving the area and not being replaced—handed over to the Maire of the village with a covering letter (1) showing date it was left; (2) stating conditions and giving description of the animal for identification on recovery. In *all* cases the A.D.V.S. of the division will be informed of the steps taken.

19. *Dressers*.—Veterinary officers will endeavour to make all dressers take an interest in their work, carrying it out systematically, economically, and in a cleanly manner. All used dressings must be destroyed by burning. Veterinary officers, as a rule, will see all their sick once daily and inspect all animals in their veterinary charge as frequently as possible. In the case, however, of a veterinary officer in charge of more than one brigade it will be sufficient if he sees all sick of one brigade daily. Veterinary officers are reminded that the most constant source of outbreaks of contagious disease and the horses most liable to neglect are those of brigade headquarters staff officers, artillery observation officers, etc., dotted here and there in broken-down buildings close to the firing line.

20. *Indents*.—Veterinary officers should indent for fresh veterinary supplies some time before the stock on hand becomes exhausted. Indents must be made on Officer i/c A.V.C. Stores, Base, *through* A.D.V.S. of the division. Only authorized articles and drugs should be indented for.

21. *Collecting station*.—During active operations a veterinary collecting station or stations will be opened by the Mobile Section in the vicinity of the bulk of horses of the division in action. The situations of such dressing stations will be notified in Divisional Operation Orders. Wounded or injured animals in the vicinity of these stations will be sent direct to the nearest. During a stationary action, i.e. when on the defence or during trench warfare, veterinary officers will endeavour to organize first-aid dressing stations in their unit or brigade and will send all wounded horses, after receiving first-aid, to the veterinary collecting station in batches, placing the senior N.C.O. or oldest soldier in charge of the party with orders to prevent all straggling, and return with his party at once on completion of his duty. During a moving action, i.e. an advance or retirement, veterinary officers will still endeavour to introduce organization into the system of evacuating wounded horses

and so prevent great and unnecessary straggling. During an action veterinary officers will keep the A.D.V.S. informed of the horse casualties sustained daily in the units in their veterinary charge.

22. The position of a veterinary officer during an action is :—

- (a) V.O. to R.A. units—with wagon line.
- (b) V.O. to infantry brigade—with 1st line transport.
- (c) V.O. train—Headquarters train or as directed by A.D.V.S.

If he is called upon to perform any duty elsewhere, he must leave word with the A.V.C. serjeant of his whereabouts and return to his position as soon as possible after performance of the particular duty.

23. *Returns*.—Veterinary officers will render weekly, on Army Form A 2000, to _____ midnight a return of all sick and wounded horses in the units in their veterinary charge. This return must be rendered to reach the office of the A.D.V.S. of a division by _____ morning. One such return will be sufficient for units of any one branch of the service in one veterinary officer's veterinary charge. In compiling this return the following points must be strictly observed :—

- (a) Cases on hand at the time of rendering last return must be accurately carried forward.
- (b) Cases admitted since, and cases "died or destroyed," will have shown in the column of remarks opposite to them the actual causes for admission or of death.
- (c) The nomenclature laid down in Appendix, Field Service Regulations, A.V.C., must be strictly adhered to.
- (d) Any abnormal conditions affecting the unit and not already reported to the A.D.V.S. in writing for the week under review, such as poor condition of any horses of a unit, bad forage, indifferent stable management, etc., will be written up on the back of the form. Any explanation of an outbreak of any particular class of disease, such as colic or kicks, will be similarly written out.
- (e) The greatest care must be taken that all cases off work and undergoing veterinary treatment or attendance must be included in this form, otherwise the statistical value of such a return is practically nil.

24. *Stationery*.—Veterinary officers should be in possession of the following :

- (a) A large scale map of the district they are working in.
- (b) Army Books 152 and 153 (map and books are obtained from their brigade headquarters).
- (c) Field Service Regulations, Part II.
- (d) Regulations for Army Veterinary Service, Appendix I.
- (e) Army Forms A 2000, sufficient only for the time being (obtained from A.D.V.S. of division, as required).
- (f) Case book (in officer's chest); fresh supplies are obtained from A.D.V.S. of division when required.

All correspondence will be carried on in Army Books 152 and 153. The use of foolscap or scraps of paper is prohibited.

25. *Correspondence*.—Veterinary officers must make themselves acquainted with the system of "minuteing-on" correspondence, carefully numbering minutes.

26. *Secret documents*.—All correspondence received marked "secret" or "confidential," if minuted-on or replied to, must be placed in an envelope, marked "secret" or "confidential" and fully addressed. Such envelope will then be placed in another envelope fully addressed, but not marked "secret" or "confidential."

27. *Aim*.—It cannot be too strongly impressed upon all veterinary officers that the value of the A.V.C. with a field army (as distinct from with line of communication troops) depends entirely on its ability to keep the horses of field units efficient and to relieve units at the earliest possible moment of the incubus of inefficient horses. These objects can only be attained if executive veterinary officers unceasingly perform their duties as advisers

on stable management and all other matters directly or indirectly affecting the health and condition of the horses in their veterinary charge, and if they systematically evacuate all sick and injured horses, excepting the most trivial cases. Tact and energy, particularly energy, will carry them a long way. For the information of recently posted executive veterinary officers the following common stable management faults and their results, now increasingly found in the British Army, are enumerated :—

- (a) *Lines*.—Too crowded ; breast ropes too slack ; unnecessary destruction of trees by using them as supports ; neglecting to prepare for bad weather by draining and making hard-surface standings ; crowding kickers among other animals (a source of 20 per cent. of all preventable injuries) ; using short stakes and head ropes to picket animals (a source of over 65 per cent. of all preventable injuries) ; crowding horses into indifferent or insanitary, sometimes disease-infected, stables, barns or even hen-houses ; absolute or partial neglect of lines, sanitation (units appear to forget that it is almost certain another unit will have to take over their filthy lines).
- (b) *Watering*.—Too fast a pace to and from ; indifferent or no supervision at ; men remain mounted for long periods waiting their turn to water ; girths unslacked and bits left in the mouth while watering ; large watering parties on public roads with nothing but head ropes to control the horses by ; watering by riding into ponds or streams, resulting in the horses drinking liquid mud and fouling every other watering place further down stream ; want of good watering stable management is the direct cause of the majority of cases of poverty among animals in a field army.
- (c) *Exercising*.—Too little of, when unit stationary ; far too fast a pace at (frequently while the head of an exercising party is apparently proceeding at a reasonable pace the rear is from time to time halting and galloping) ; indifferent or no supervision at (an officer or N.C.O. in charge of an exercising party can only exercise supervision when in the rear or wide to a flank, yet he generally rides at the head).
- (d) *Grooming*.—Very much neglected. . Excuses as to inability to obtain grooming kit from Ordnance do not hold water nine times in ten. Investigation generally shows they have not been, or only recently have been, indented for. Indifferent grooming is the indirect cause of most skin disease and all lice.
- (e) *Feeding*.—Great waste of forage, particularly hay ; nosebags and hay nets should invariably be used when animals are fed in the open—nothing excuses the waste caused by feeding off the ground ; irregular feeding hours ; feeds not taken with horses on long marches ; musty and bad hay deliberately fed to animals to save the trouble of making a complaint ; fancy feeding with beet, molasses, young wheat, etc., etc. (while useful in the case of sick or debilitated horses, unnecessary and contra-indicated for efficient horses with field units).
- (f) *Want of stable or line supervision*.—Line guards posted as a matter of form and with no definite orders ; when orders given they are not enforced ; absence of an officer or even a senior non-commissioned officer from stables, particularly early morning stables ; nearly 50 per cent. of all casualties, i.e. all horses on the sick list from any cause whatever are due to preventable disease and injury resulting from the above common stable management faults.

28. *Military situation paramount*.—Above everything else, executive veterinary officers, in common with administrative veterinary officers and the veterinary officer commanding a mobile section, must bear in mind that when any veterinary necessity of the moment comes in conflict with a purely military necessity, the former *must* go to the wall, unless they are satisfied

that the authority responsible for the military necessity is not aware of the far-reaching results, from a veterinary point of view, in which case they can represent the matter to the military authority in question, who alone is in possession of all the facts of the situation and who alone can decide.

IV.

CARE AND MANAGEMENT OF CAMEL TRANSPORT IN (A) CAMPS AND (B) LINE OF MARCH. (EGYPT, APRIL, 1916).

The camel is a delicate animal, and to obtain any good results from its employment it must be handled with great care and consideration. Camel transport has invariably proved a failure with British troops from failure to observe the ordinary principles which every private camel owner follows, viz. :—

Never overload.
Never overtax.
Never neglect.

As far as possible, and there should be no difficulty at present, there should always be 33 per cent. spare camels. To work camels 8 to 9 hours (many of them very hot) a day, 7 days a week, under excessive loads is a disastrous procedure. A total of 40 hours a week before 8 a.m., or after 5 p.m., should not be exceeded except in case of military necessity.

A.—Camps.

1. A camel camp should be not less than a mile from vegetation and water, owing to the presence of flies which spread disease. The ground should be level, free from stones, and, whenever possible, sheltered from the wind in cold weather.

2. *Feeding.*—The proper feeding and watering of the animals is the most important factor in maintaining the efficiency of camel transport. Officers commanding companies should arrange that company officers, non-commissioned officers, and drivers, are present at feeding and watering parades. All other work should, as far as possible, give way to this. Animals not eating or drinking well should be noted and attended to.

The usual daily ration in camp is 8 lb. of grain and 12 lb. of tibben. The camel should be given half his ration in the morning and the other half in the evening.

Forage should never be placed on the ground. Some sort of a manger should be provided, or the food should be placed on a cloth or sack.

3. *Watering.*—The frequency with which camels should be watered is a controversial subject which it is not proposed to discuss fully in this memorandum.

In the ordinary course, camels should not be required to go without water for more than 24 hours, and they should, therefore, whenever possible, be watered daily. If the military situation necessitates a prolonged abstention from water the Soudan camel should, as far as possible, be employed. When necessary, the Delta camel with judicious management and training can be accustomed to work for periods of 2 to 4 days without daily watering.

Camels when thirsty require daily from 15 to 25 gals. each. When they are very thirsty they must not be allowed to drink their fill as soon as they reach the water, but should be allowed 4 to 5 gals. at first and should be brought back at a later hour to drink all they require.

They should only be watered some hours after feeding, and should, if possible, be watered from troughs. Camels will not drink until the sun is well up in the morning. Brackish water is not harmful; they usually drink it with relish.

Note.—No camel should be taken from the water until it is certain that all have finished drinking, as some drink more slowly than others, and will cease drinking when they see their companions leaving the water.

4. *Grazing*.—When morning stables and parades are finished the camel should at once be sent out to graze. The plants that a camel eats are very numerous and vary in every district, many being of the most unlikely appearance and very thorny, but even these are excellent feed if the camel is accustomed to them.

5. *Grooming*.—The camel should, whenever possible, be groomed regularly once a day, particular attention being paid to the grooming of his hind legs, as the camel frequently stales down his legs, and if these are neglected, troublesome sores are formed. When flies are troublesome, and wherever the skin looks at all unhealthy, camels should be "battered" every 15 to 20 days with mange dressing (this is made up in the veterinary stores and issued ready; its main constituents are sulphur and semn oil). The ground used for stables should be frequently changed.

B.—On the Line of March.

Subject to military necessity, the considerations to be borne in mind are :—

1. The animals should not work more than 8 hours a day.
2. They should be allowed to graze as long as possible between 9 a.m. and 5 p.m.
3. The personnel must get sufficient rest at night.
4. With marches of not more than 15 miles the whole may be done at a stretch, but if a journey of 20 miles is contemplated it is better for the larger half to be done in the morning, and the balance in the evening. If more than 20 miles have to be marched, the extra distance should, if possible, be done at night.

5. *Pace of March*.—The pace of baggage camels under favourable conditions is $2\frac{1}{2}$ miles an hour.

6. If circumstances permit, the camels should be on the road by 2 or 3 a.m. In hot weather, they should not be called upon to march between 8.30 a.m. and 4 p.m., but in very hot weather it is often advisable to make two marches during the hours of darkness.

7. *Picketing*.—On the line of march camels should generally be hobbled when grazing, and invariably so if active military operations are in progress. At night camels should be picketed, care being taken to ensure the head-rope when tied to the picketing rope is left sufficiently long to enable the camel to turn his head and neck freely, and that the head-rope is tied with a draw knot which can be quickly and easily undone. Not less than two yards of frontage should be allowed for each camel.

8. *Feeding on the March*.—On the march the ration is 10 lb. of grain. When camels are on full rations they should be given half their ration (5 lb.) in the morning, and the other half in the evening. If on half rations, they should be fed after the evening march only. If very early starts are made, the first feed should be given after arrival in camp, but if time permits of feeding before saddling up, 3 lb. should be given then, and the remainder with the evening feed, but never more than 7 lb. at one feed.

When camels are tired they should (1) be allowed to rest for at least an hour before a ration of grain is given them and (2) be allowed to rest as long as possible after being fed for the purpose of ruminating.

9. *Loads*.—The average camel load is 350 lb. in weight, or two fantasses, each containing about $12\frac{1}{2}$ gals. of water.

Great care should be taken to see that loads, when on the camel, are properly balanced and securely tied. The animals should not as a rule be made to bear their burdens for more than 6 hours at a stretch.

10. *Saddlery*.—The first consideration is a properly fitting saddle, and the greatest care should be taken to see that the saddlery is in good order. This is all important if efficiency is to be maintained.

Care should be taken to ensure :—

- (1) That nothing is carried on the saddle which rubs against the camel, and that the saddle does not pinch the camel's withers or work back on to the hip bone.

- (2) That the saddle does not lie on one side, is properly girthed up, and does not oscillate.
- (3) That the breastplate is worn sufficiently tight.
- (4) That after being saddled and before starting all camels are made to stand up so that they can stale.
- (5) That saddles are not removed on halting until the back has cooled down.
- (6) That camels are carefully inspected for saddle galls and that no animal is worked when suffering from a sore back, but is sent to hospital if it does not show signs of improvement.
11. *Halts*.—A halt of 10 minutes should be made about half way during a march of over 10 miles to allow the animals to urinate.
12. *Personnel*.—*Camel Transport Corps*.
 - (1) It is very desirable that all officers should be able to speak Arabic, as otherwise it is very difficult for them to interest themselves personally in the people with whom they are working.
 - (2) Officers commanding companies should pay particular attention to the necessity for :—
 - (a) Feeding their men properly ;
 - (b) Arranging for their earnings to reach their dependants ;
 - (c) Patiently hearing their grievances ;
 - (d) Granting them leave when necessary ;
 - (e) Supervising the sanitary conditions of the camp and burning all refuse.

V.

MANGE IN CAMELS (EGYPT, 1917).

Nature.—Mange in camels is a contagious skin disease due to an animal parasite.

Prevalence.—It is very common in Egypt, about 65 per cent. of the animals in the country being affected. It was in consequence of this fact that, from the commencement of military operations, many camels that were actually suffering from the disease were bought and were treated while employed on military work.

Description and Life History of the Parasite.—The parasite is round oval in shape, about 1/50th of an inch in length and width ; its presence can be demonstrated by taking a deep scraping of the skin and examining it under the low power of a microscope.

The females are more numerous than the males, and under favourable conditions multiply very rapidly. They burrow into the skin and lay 20 to 24 eggs, which hatch out in one to seven days, depending on the season of the year. Fifteen days after hatching out, the parasites are sexually mature. The duration of the life of the parasites and their eggs, detached from the body, is not definitely known, but it is certain that they can retain their vitality for a considerable time in blankets, the lining of saddles, and on the ground. It is also known that parasites or their eggs may be stored in the depths of the skin, and may reproduce the disease, after a lapse of time, in apparently cured animals.

Infection.—The common method of infection is by immediate contact, or through the medium of blankets and saddles. Infected camps and railway trucks are also a source of infection. A dirty skin, neglect of grooming, and want of general care, hide the disease in the early stages, and add to the danger of general infection. Syces may become infected with mange and transmit the disease to camels, but the parasites do not, as a rule, live for more than one generation on human beings.

Symptoms.—Itchiness of the skin and minute eruptions, which cause the hairs to stick together and form small scabs, or to fall out and leave bare patches. Animals evince great pleasure on being scratched. The itching is

greater at night than during the day. When there is an extensive infection of the skin it prevents the camel from resting, with the result that it loses condition and suffers from debility. The animal rubs itself against posts, trees, or any object in the vicinity. The disease can be detected in the early stages by passing the hand over the suspected parts, when the minute eruptions on the skin can be distinctly felt.

The disease usually begins on the legs and upper part of the body; the part of the skin first affected, however, depends on how the infection was obtained. In neglected cases it spreads all over the animal.

Measures to be adopted to deal with the disease.—Under service conditions it is not possible, without disorganizing the transport service, to adopt radical measures to stamp out the disease, but much may be done towards keeping the disease under control, and preventing the spread of the infection, by dealing with it in a systematic manner.

Co-operation of Efforts.—To ensure good results, the co-operation of the efforts of the officers commanding units with those of the veterinary service is most essential.

Inspection.—An inspection of all camels should be made daily by unit commanders, or an officer deputed by them.

The camels should be grouped thus :—

- (a) affected ;
- (b) doubtful ;
- (c) free.

Transfers from group to group should be made as occasion requires, the camels being worked in these groups as far as practicable.

Change of Camp or Lines.—The use of lines recently evacuated by other camel units is not recommended, unless they are known to have been occupied by camels free from mange.

In standing camps, a change of line to allow the ground to be cleansed is beneficial. When camp space is limited a change from one side of the picket line to the other, once weekly, will suffice, evacuated lines being levelled up and raked over.

Disinfection of Equipment.—The lining of the saddles, girths, breast-plates, and head collars, of mangy camels should be washed once weekly with a 5 per cent. solution of cresol (obtainable at all supply depots). Articles used for grooming should be washed daily in this solution.

It is important that the rugs of affected animals should not be used for healthy camels. The inside of the rugs should be exposed to the sun during the day, whenever possible.

The disinfection of rugs presents many difficulties, but every opportunity should be taken to get them disinfected periodically. On application, the A.D.M.S., Egyptian Hospitals, Ismalia, will notify the officer commanding concerned when the moveable disinfector will be visiting a railway station in the proximity of the unit, and will arrange for the disinfection of the rugs.

It is easier to keep the disease under control during hot weather, when rugs are not in use.

Change of Personnel.—Personnel detailed to look after mange cases should be camped together as far as possible, and should not be detailed to look after other camels.

Evacuation of bad cases.—Camels with general infection, except those in good condition, should be evacuated to the nearest veterinary hospital, whose officer commanding should be notified when they are sent by rail, to enable arrangements to be made for the disinfection of the trucks.

Site of Dressing Stations.—The dressing and clipping stations for camels with mange should be separate from those used for animals free from this disease and should be on the leeward side of the camp.

The clipping station should be banked round with sand, and the hair collected and burned on the spot, before mid-day and evening stables.

Treatment.

Scraping.—To ensure good results it is necessary to clip, scrape, and brush the affected parts before the application of the dressing.

Clipping.—When the camels of a unit are kept "clipped out" up to date, the disease is observable in its early stages and easier to cure and control. In the very cold weather the coat over the upper part of the body may be left to provide extra warmth, but if there is any suspicion of mange the animal should be "clipped out" whole.

When the disease is purely local, clipping around the affected parts will suffice. This, however, is in addition to the periodical clipping, which should be carried out during the winter.

Clipping scissors should be cleaned with a rag which has been dipped in paraffin after clipping each animal.

Scraping and Brushing.—This may be carried out with a knife or piece of hoop iron. The scabs, scurf, and dirt should be thoroughly scraped from the parts to be dressed, the articles used being frequently dipped in a solution of disinfectant.

Care must be taken that the skin is not scraped too drastically, as this may produce local patches of inflammation which are difficult to distinguish from the irritation caused by the mange. When crusts are difficult to remove they can first be softened by washing them with soap and water.

The scrapings, together with the hair, should be collected and burned or buried on the spot.

When the infection is general, it will be necessary to scrape the animal from head to foot. After scraping, the skin should be well brushed over, the brush, wisp, or whatever article used being dipped in disinfectant from time to time during the process.

First Dressing.—All dressing should be applied before noon to allow the sun to melt it, so that it penetrates the upper layer of the skin. It should be well rubbed in by the hand, and no surplus dressing should be left on the surface of the skin. Smearing the dressing over the surface is wasteful as well as worthless.

The dressing kills the parasites on the surface, and suffocates those in the depths of the skin.

Before the dressing is applied, the tins should be well shaken and contents stirred up alternately, to make sure that the sulphur and oil are thoroughly mixed. After shaking and stirring, it is a good plan to pour what is required for one camel into an empty biscuit tin or other suitable receptacle, when it can be well mixed with the hand before application.

After being dressed, the camels should be tied together in a circle, in charge of a native guard, and not allowed to lie down for four hours, to prevent absorption of the dressing by the sand.

Any parts that appear dry during the following six days should be dressed again without scraping. As the camel uses the mouth and the feet for biting and scratching affected parts, these parts should not be overlooked during the dressing and subsequent applications.

Second Dressing.—The first dressing should be allowed to remain on for seven days, when it should be scraped off and more dressing applied, the dry parts being dressed again as previously.

Third Dressing.—Two weekly dressings generally suffice for mild cases of mange, but when the disease is extensive, a third weekly dressing will be necessary, the procedure being the same as with the first and second dressings.

There is a tendency to chill in cold weather, when camels are dressed all over. This can be avoided by exercising the animals or putting their rugs on after the dressing has been applied.

Washing.—After cure, a thorough washing and scrubbing must be given. Any kind of water will do for this, but advantage should be taken of sea water whenever possible, as this has a beneficial action on the skin. During the winter months the animals should not be washed before 10.0 a.m., and

they should be walked about smartly to assist drying and to prevent chill. Washing is not advisable on very cold or sunless days.

Exercise and Food.—Patients require exercise during treatment, to keep up the action of the skin, and a liberal amount of good food to enable them to retain condition. Green food and grazing are most beneficial.

Rugs.—During cold weather it is advisable to keep the animals well rugged up during the day, and particularly after clipping. If available, two rugs should be put on at night time.

Grooming.—Grooming the affected parts is unnecessary while the animals are under treatment.

Supervision.—All dressing and clipping should be supervised by an officer or reliable N.C.O., as it is only by attention to details in the treatment that the best results are obtained.

Provision of Mange Dressing.—To obtain good results, it is essential that the dressing should be carried out regularly. If it is neglected for a few days no progress will be made in the treatment, and there is more risk of healthy camels being infected. Every undressed camel is a centre of infection for others. It is important, therefore, to forecast requirements of mange dressing and arrange for delivery, allowance being made for delays in delivery.

VI.

THE ECONOMIC USE OF VETERINARY MEDICINES.

"On the closing of the Remount Depot, X———, the following excess in drugs was returned to this Store :—

"Ammon. Carb., 53 lbs., supplied in April, 1915.

"Calcium Carbide, 50 lbs., all but 6 lbs. supplied in January, 1916.

"Glycyrrhizae Rad., 25 lbs., supplied in March, 1915.

"Iodized Petrol, 26 lbs., all but 4 lbs. supplied in February, 1916, and returned in case packed as issued from this Store.

"Polyvalent Bacterin, 558 doses, supplied in June, 1915.

"Anti-tetanus Serum, 15 doses, supplied in December, 1915.

"The last two drugs are now well out-of-date for safe use, and will have to be destroyed."—(*Extract from a report from Officer i/c Army Veterinary Stores, dated 26th July, 1916.*)

The above is a striking example of thoughtless waste and is by no means an isolated instance of the careless way in which application is made for veterinary stores greatly in excess of actual requirements. At the present time, when the need for economy is of the utmost importance, such unintelligence and lack of attention to detail as are involved in waste of this kind are inexcusable.

In the above report the nature as well as the amount of at least one item calls for criticism.

It cannot be seriously alleged by any individual with any pretension to modern scientific knowledge that powdered liquorice is, as a therapeutic agent, of real economic value in the treatment of Army horses.

The word economic is used advisedly since it is necessary in military, as apart from private, practice, rigidly to avoid the use of drugs of a non-essential nature.

With increase of knowledge it has become clear that the majority of drugs have no economic value as therapeutic agents, that is to say that they do not favourably influence the course of disease to an appreciable extent. In private practice they continue to be valuable in that they impart to preparations in public demand certain characteristic features such as odour or appearance. The use of many non-essential drugs undoubtedly has thus become a habit and it behoves every practitioner concerned in dispensing and prescribing drugs at the public cost for public animals to revise his therapeutics and only to use such drugs as are *known* to be valuable in the economic sense. The number of the latter is small.

In indenting for drugs minimum rather than maximum requirements should be estimated. The value of a drug is usually largely dependant upon its freshness, and the Army Veterinary Stores at Woolwich are not so inaccessible as to justify the stocking of a pharmacy as would be necessary to provide against a siege or a famine. Moreover, the temporary nature of everything military in time of war renders the holding of large stocks of drugs especially unnecessary and injudicious.

It is the inefficient practitioner who makes great show and use of drugs.

Pressure is frequently brought to bear by laymen upon veterinary officers attached to units to prescribe powders of various kinds for what is known as "conditioning" purposes.

This practice should be discountenanced as, in the absence of organic disease, any defect in condition may, as a rule, be remedied by intelligent attention to stable management. If the latter is neglected medicinal agents will not make good the neglect. In otherwise progressive days the superstitious devotion to drugging of horses amounts with many people to a fetish. The wholesale administration of Epsom salts is a concrete example of this anachronism. The effect of this drug, prescribed as a so-called alternative, is negligible and does not therefore justify the expense involved in its administration for that purpose. It is for veterinary officers to bring contemporary knowledge up to date, and sternly to refuse to prescribe needless drugs at the request of people ignorant of such matters.

Approximately one hundred tons of Epsom salts have been expended in connection with army horses at home and with the expeditionary forces during the past twelve months. Of this large amount it is safe to say that 50 per cent. has been unnecessarily expended, that is, has been administered to horses for "alternative" purposes.

The greatly increased cost of most drugs, the large doses that are appropriate for horses as compared with human beings, the enormous increase in the animal strength of the army, are all factors that contribute to the importance of putting into economical practice modern knowledge as to the inefficacy for veterinary therapeutic purposes of the majority of drugs as *habitually* prescribed.

VETERINARY DEPARTMENT,
WAR OFFICE.

1st August, 1916.

VII.

INSTRUCTIONS FOR DEALING ECONOMICALLY WITH HIDES AND CARCASSES OF ARMY HORSES AND MULES.

1. Disembowel the animal immediately on death. In order that the hide shall not be injured the opening should be made at the dotted line in the centre of the belly as in Diagram 1.

2. Carefully remove by cutting with shears all hair from mane and tail, wash, and store in a dry place.

3. Open the horse hides at the dotted lines in Diagram 1. The skin from the legs should be left full length and cut straight throughout right over the centres of the knees ceasing at the flanks which must be left entirely as belly and not partially as shanks.

NOTE.—The largest possible surface is of greatest importance, and can only be obtained by cutting as indicated by the dotted lines.

4. An experienced slaughterman will no doubt prefer to use his knife for flaying, but an inexperienced workman will find that the hide can be removed from the carcass by beating it out with a wooden mallet; under no circumstances however must an iron mallet be used, as this will cause the grain to burst and seriously depreciate the value of the hide.

5. At least 5 inches of the skin of the tail should be left on the hide, or preferably the whole dock.

NOTE.—When the hide is removed and spread out it should appear as Diagram 2.

6. Cut off shanks, leaving hoofs on.

7. Trunk the carcass, *i.e.*, remove the fore and hind legs. As much flesh as possible should be left on the legs, and they should be put on rail entire, *i.e.*, in the bone.

8. The back should be removed each side in one piece.

9. The throat, neck, ribs, etc., if time permits should be removed, but they are of small value, and should not be sent with the quarter and back meat. A local pig-keeper or poultry farmer will probably buy these, also the stomach, bowels and runners.

10. Remove all fat and render down by boiling in a copper. The oil thus obtained is valuable. It may suitably be used for external purposes in veterinary hospitals in place of other oils.

11. The flesh should be hung up to drain immediately it is cut, and later should be put on rail to the consignee. There is no need to bag the flesh, but the railway company should be advised that the truck contains perishable goods.

NOTE.—Advise consignee by postcard as soon as flesh is put on rail.

12. When the stomach, bowels, and runners cannot otherwise be disposed of they form in themselves a valuable manure. When, however, they have to be buried, their contents should first be removed to economise space; such contents can most easily be removed by slitting open by inserting a knife, with a stud on the point, in one end of the runner or bowel and running same along.

13. Knock off shoes with an axe and store.

NOTE.—Shoes from dead horses are at present being sold in London at a good price. It is suggested that a number of them may be found useful for re-shoeing.

14. If reasonable facilities are available for boiling, a considerable quantity of oil may be obtained by boiling the bones, which should previously be chopped reasonably small. The de-greased bones can be stored, and when a fair quantity are in stock can be disposed of at a good price. The hoofs should be sold with the bones.

NOTE.—Before they are boiled the marrow bones should be opened by means of an axe to allow the oil to escape.

15. Where there are no facilities for the sale of flesh and bones, *i.e.*, in the area of armies, in Egypt, Salonica, etc., instructions Nos. 1 to 6 may be carried out, and the hide should immediately be salted in accordance with the instructions herewith, and stored in a cool place. The fat should be removed immediately, and thrown into cold water for subsequent boiling down. The flesh should be removed from the bones and buried, the object of removal from the bones being to decrease the volume, and thus to save much labour in burial.

The contents of the entrails should always be removed. The bones should be chopped small, the marrow bones always being well opened, boiled (to extract the fat) and buried, or, if possible, stored in stacks. They will, however, attract flies during hot weather unless buried. If buried, bones from which the fat has been extracted will retain their commercial value for years. This at the present time, is not less than £5 a ton.

Blunt hooks are used by all professional knackers in handling carcasses, removing hides, meat, etc., as in this way the work is done far more expeditiously than if only the hands are used. After a month's training, a man should be able to dispose of a carcass in the method described above in ninety minutes.

Tools required are butchers' knives, steel blunt hooks, axes, mallets and shears.

Instructions for Preservation of Hides.

1. Remove larger pieces of meat (if any) left on the hide, also mane fat (if any).

2. Lay out hide, hair side downwards and allow to cool, then salt well with clean salt. The salt should be well spread, care being taken to allow a sufficient quantity for the legs and head. About 7 lbs. (seven pounds) of clean salt is required for each hide. The hides will then keep for a considerable time. If they are disposed of weekly, less salt will be required.

3. Store by laying in level stacks with head and legs turned in, but otherwise flat with hair side downwards.

4. When preparing for despatch, turn the head and legs in, then fold from head to butt and roll, tie with string and attach a label to each bundle. One hide only should be put in each bundle.

5. Obtain a receipt from the railway company for all goods sent.

Notes on Sale of Hides and Meat.

Hides.—Should be consigned, if possible, weekly to Messrs. Hermann, of 75, Maltby Street, Bermondsey, S.E., who will pay at market rate for them.

Present prices are :—

First	...	...	...	...	...	...	32/-
Second	...	...	...	...	...	...	28/-
Third	...	...	...	...	...	...	24/-
Fourth	...	...	...	...	...	...	20/-

Mule hides are worth about 8/- each.

Generally speaking, for a hide to be classed as first quality it must be a heavy hide, weighing at least 65 lbs., opened as in Diagram 1 herewith, free from skin disease and undamaged.

Meat.—It is preferable, when possible, to sell the meat raw to a local pig-feeder or poultry farmer, or to local kennels. A reasonable price for raw horse or mule meat in good condition is 5/- a cwt. Pig dealers will purchase the entrails at a lower rate. If no local sale can be found for the meat it should be put on rail to Messrs. Harrison, Barber & Co., Ltd., of London, or other reputable firm in London or a provincial town.

ARMY VETERINARY DEPARTMENT,
WAR OFFICE.

3rd March, 1917.

Diagram No. 1.

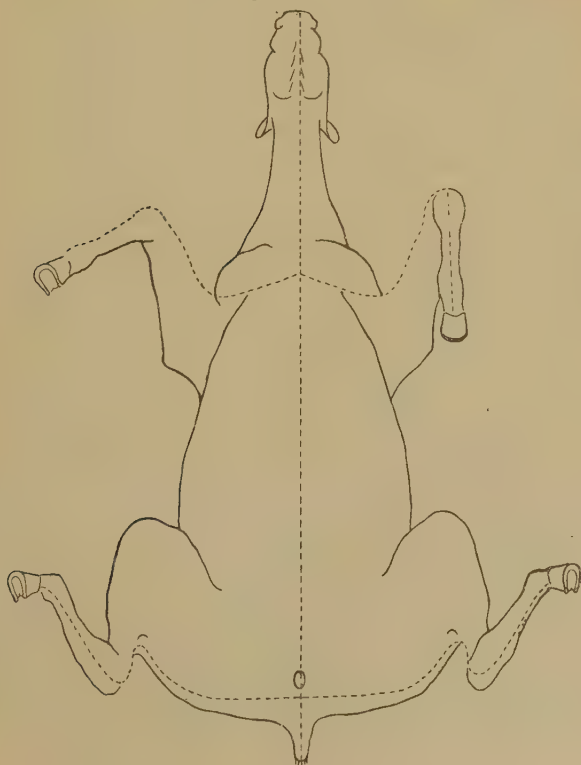
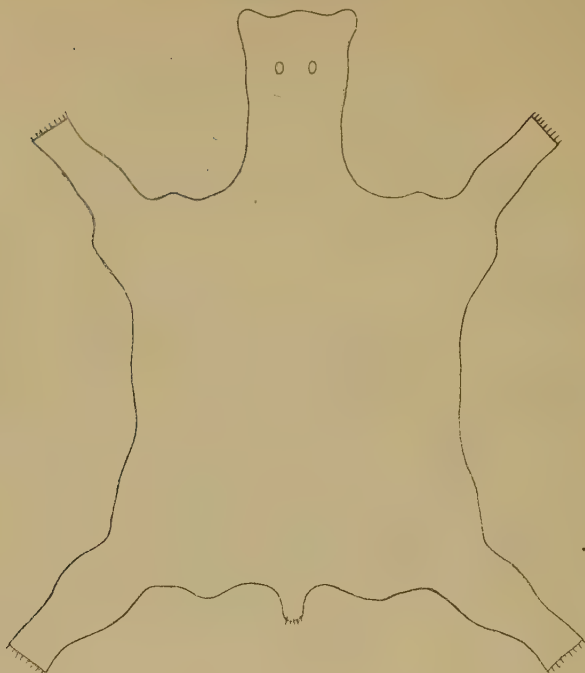


Diagram No. 2.



APPENDIX C.

TRANSPORTATION OF ANIMALS BY SEA.

I.

CARE OF HORSES ON BOARD SHIP.

(Official pamphlet issued in January, 1916.)

Strict attention to the following brief instructions is essential to success in care of horses on board ship :—

1. *Rejection*.—Only healthy horses to be shipped. Rejection of any horse having a temperature over 102 or any other evidence of contagious disease is necessary.

2. *Cleanliness*.—Mucking out must begin at once, and be continued throughout the voyage. Filth must not be allowed to accumulate anywhere.

3. *Disinfection*.—Of first importance, as a routine measure and with special directions to standings, halters, hay nets, and all fittings contaminated with discharge from infected animals. When ships are returning empty or proceeding to another port for a fresh cargo of horses or mules, advantage should be taken thoroughly to cleanse, disinfect, air, and limewash the horse decks. The limewash should contain 5 per cent. of a reliable disinfectant. All decks and holds should be sterile on arrival at the port of loading.

4. *Discipline*.—The veterinary officer must be energetic himself; there must be unremitting attention to, and supervision of, watering, feeding, mucking out, exercising, etc. The disciplined and energetic co-operation of all concerned is essential.

5. *Removal of Sick Horses and Mules*.—The sooner a sick animal is detected and removed to an airy upper deck the better will be the chances of recovery and the less the spread of infection. The first principle in treatment of sick horses on board ship is the application of fresh air.

Conducting officers must be ever on the alert to pick out ailing animals.

On board ship, prevention and hygiene are everything; treatment, after disease is thoroughly established, nothing. Active disease must be actively anticipated, and it is by such homely and common sense and energetic measures as those now under consideration that the best results on horse and mule ships are obtained. Exchanges of animals from deck to deck should be a daily task, healthy and robust animals being moved when necessary from the upper deck, or more airy place, to make room for ailing animals from a lower or badly ventilated situation. The thermometer should be freely used in order that rising temperatures may be detected and checked by timely removal of the patient to more advantageous surroundings.

6. *Treatment of Sick*.—Do not attempt to treat hopeless cases; it is contrary to hygienic principles, and leads to infection of neighbouring horses. Avoid unnecessary drugging; prevention, hygiene, and active individual attention are far more efficacious than drugs on board ship. Vaccine and serum treatment have been found of no use on board ship.

7. *Ventilation*.—Enlist the co-operation of the ship's officers in utilizing to the utmost every means of ventilation provided. Wind-sails, wind-scoops, and the like need constant attention.

The conducting officer should take pains to make friendly acquaintance with the engineer officers or such ship's officers as he may find willing to interest themselves in devising practical expedients for the improvement of ventilation. A thoughtful man will always find possibilities for improving,

with such facilities as are available on board ship, the means of ventilation that exist.

8. *Septic Pneumonia*.—Every case of septic pneumonia occurring on board ship will be destroyed as soon as the odour of the gangrene enables a definite diagnosis to be established. The carcase will be immediately thrown overboard and the stall and fittings thoroughly disinfected.

9. *Pens versus Stalls*.—It is strongly recommended to travel horses loose in pens formed by removing enough side bars to from pens for five to ten horses, according to the construction of the ship. Vicious horses should be retained in stalls. Contrary to the prevalent idea, horses carried loose in pens are less liable to falls and consequent injury than those in stalls.

10. *Watering*.—The principal factor affecting the condition of horses on board ship is the attention paid to watering. It is a curious characteristic of human nature that animals are never allowed to go short of food, when such is readily available, but that the equal and, on board ship, greater need for abundant water is frequently overlooked.

If water is freely given, if no horse is ever allowed to suffer for a moment from thirst, the good condition of horses on that ship is assured.

Given abundant and frequent water, animals will maintain and even put on condition on board ship on a diet of hay alone.

It is safe to assume that consignments of animals arriving at a port of disembarkation in markedly poor condition have been neglected as regards watering. The following interesting extract from a report by a successful conducting officer is appended :—

"I take the liberty of mentioning that, from my experience on horse and mule transports, I find one of the chief difficulties is to get the animals properly watered.

"When given charge of the horses on the S.S. 'Englishman,' I found the horses were unduly thirsty in the early morning, particularly when the decks were at all warm and the hay dusty. To overcome this, I had all the horse feed troughs made watertight, and gave orders that in addition to the usual watering of four times daily, each horse was to have a full trough of water after feeding hay at 7 p.m., all troughs to be left full, after horses had finished drinking, and to be taken down during the night, when empty, by the night guards. Almost without exception these troughs would be empty before the morning."

11. *Feeding*.—It is difficult to lay down hard and fast rules as regards feeding on board ship, as so much depends on the type of animal carried and upon the meteorological conditions prevailing on the voyage. The following procedure is safe on a voyage of medium duration in temperate climates.

- (1) No oats for first three days.
- (2) On fourth and fifth days give 2 lb. of oats per diem.
- (3) On the sixth day give 3 lb.
- (4) Thereafter increase to, but on no account exceed, 4 lb. daily.
- (5) Bran, damped and salted, and hay may, and should, be given freely throughout the voyage.

Of the above recommendations those numbered 3 and 4 are not applicable when great heat is encountered on the voyage. Under such conditions it is best to rely principally on water, hay, bran, and salt; especially is this the case with mules.

The consequences of over feeding with grain on board ship are disastrous. Colic and its complications, heart failure, ship staggers, are certain to ensue.

12. *Exercise*.—This should be carried out wherever and whenever possible. Travelling horses in pens instead of stalls compensates greatly for lack of regular exercise.

13. *Ship Staggers*.—A disease simulating epilepsy in man. Bring the animal under an open hatchway and douche the head with cold water. Whenever an animal is seen to be distressed bring it under a hatchway.

14. *Foothold*.—Sprinkle ashes freely on platforms in rough weather and along alley ways whenever an animal has to be moved.

15. *Glanders*.—The possibility of an outbreak of glanders on board ship must ever be borne in mind. There is no form of epidemic so far-reaching in its effect on horses and mules than an outbreak of glanders occurring, and remaining undetected, on board ship. Cases of glanders are especially prone to be overlooked when cases of catarrh are prevalent among the animals. A good rule, therefore, is never to take a nasal discharge on board ship for granted as being one of catarrhal or strangles nature. A clinical examination of every case of nasal discharge should be made daily. If there is any clinical reason to suspect a case, then there is good reason to destroy such a case, as the spread of glanders on board ship is incredibly certain and swift, especially among mules.

16. *Watering and feeding at Time of Embarkation*.—It is essential that animals be given as much water as they can drink immediately before going on board, especially if they have arrived at the port of embarkation by train. Sometimes this precaution is omitted, and the animals receive no water until late in the afternoon of the day of embarkation, a bad beginning of an ordeal which calls for every ounce of their reserve strength. When hay-nets are provided they should be filled and placed in position prior to embarkation. This measure allays the excitement inevitable among animals on these occasions; the horse or mule begins to nibble at his hay as soon as he arrives in his stall, and in this way speedily acquires greater confidence in his surroundings. When hay-nets are not available for every animal, men should be told off to feed each with hay as soon as he comes on board.

17. Careful consideration of the foregoing remarks will make it clear that the successful conducting officer must be a hygienist and disciplinarian rather than a therapist, a good horsemaster rather than a skilled prescriber.

II.

HORSE AND MULE TRANSPORTS.—FOREMAN'S GUIDE WITH INSTRUCTIONS.
(By Mr. A. E. Boyer, M.B.E., M.R.C.V.S. See Chapter XXIX.)

General Instructions.

Before the ship has an animal loaded, each foreman should make himself familiar with the section he has allotted to him. He should know the number of animals he is to have under his charge, see that he had all feed tins, pails, shovels, brooms, forks, etc., in readiness to immediately commence his duties; special care being taken that all water barrels are filled and that a few bales of hay are in readiness for the first evening's and next morning's feed.

Embarkation.

On the day of loading each foreman must be in his section to note that he has the right number of animals, that his spare stalls are not filled up and that every animal is tied up securely by the loaders. When the section is filled, if he has not already had his men allotted to him he should proceed immediately to obtain, if not all, a few from the head foreman to give water and a hay feed to the animals. It is of the utmost importance that each foreman has his men allotted to him the first day. He should take their names, enter them in his book and show them the section in which they are to work, so that there will be no hitch the next morning and the ordinary routine commences first thing. The following time table for the day's work must be enforced from the first morning. If the rules are strictly adhered to foremen will find the work will proceed easily and that there will be ample time for leisure for all.

Time Table.

5.30 a.m.	Men called.
6. 0 a.m.	Water animals (as much as they will drink).
6.15 a.m.	Hay feed.
6.30 a.m.	Get up feed.
8. 0 a.m.	Men's breakfast.
9. 0 a.m.	Muck out and lightly groom animals.
12. 0 noon.	Water animals (as much as they can drink).
12.15 p.m.	Bran and grain feed (as directed).
1. 0 p.m.	Men's dinner.
2. 0 p.m.	Continue mucking out and grooming.
5.15 p.m.	Water animals (as much as they can drink).
5.30 p.m.	Hay feed. Sweep up lines.
6. 0 p.m.	Men's tea.

Water.

When it is realized that the bodies of most animals are composed of between 60 and 70 per cent. water which is constantly being removed by the lungs, skin, kidneys and intestines, it will be readily understood that unless this is replaced the animal's health will be impaired to say nothing of the torture it undergoes from thirst.

The best method of giving water is from the feed tin, into which, after it has been placed in front of the animal, should be poured a full pail of water. When the attendant has completed his string of animals, he should return to the first tin and if empty pour another half pail into same and so on down his line. The tins should then be allowed to remain from ten to fifteen minutes in front of the animals. Hay should not be shaken out or the grain feed prepared during this time, the animals being given ample time to drink all they require. On no account should the animals be allowed to drink from the pail, neither should the feed tins be dipped in the water barrels.

Each animal should have a feed tin to himself which should, as far as possible, be retained for this animal throughout the voyage. Tins which leak badly should be handed into the head foreman's stores and sound ones taken to replace them.

When each animal has sufficient to drink, the water left in the tins should be taken and poured over the side or down the nearest scupper. It is of the utmost importance that none of the surplus water is poured back into the barrels. When the barrels are nearly empty, they should be swilled round and completely emptied before refilling, which should be done immediately, ready for the next watering. No barrel should stand within reach of any animal, thereby removing one common cause of infection.

It must be remembered that although ships carry a large quantity of fresh water, there is a limit to their capacity and as there is bound to be a little wastage, care must be taken that this wastage is not excessive.

An abundance of fresh water is not only essential to life, it is in itself serviceable as a remedy for the feverish condition which is so common among animals crowded together during transportation.

From every possible point of view, humanitarian and otherwise, foremen are urgently urged to see that no animal under their charge goes short of this necessity for life.

Hay Feed.

At the present time the method of giving this feed, adopted by veterinary officers as being the most economical and effectual, is that of feeding from the floor, and it is needless to say that foremen should see that the floor is clean before the hay is placed there.

Where the alley ways are wide the hay should be shaken up and placed outside the stanchions making sure that each animal has sufficient length of rope to reach same. Where the alley ways are narrow or urine drains across from the amidships stalls the hay should be placed just inside the stanchions

The watchman for the day should be told off to walk continually round the section with a fork and draw the hay close to the stancheons while the animals are feeding.

After the feed is finished all alley ways must be swept up and lightly sprinkled with a 5 per cent. solution of carbolic disinfectant obtainable from the head foreman.

Each foreman will be given a list of the number of bales of hay he should use at each feed, but, as the weights of some bales vary, the foreman should take note of any considerable variation and add more hay if necessary.

In the feeding of mules the weight of hay per animal should be about 5 or 6 lb. per feed, for horses 6 to 8 lb. per feed. Each bale has a small label attached to it giving its weight; a little calculation will easily determine the quantity required should they show a considerable variation.

Careful note must be taken of the quality of the hay when the bales are opened and on no account should a mouldy or sour bale be used for feed. All wires from the bales should be rolled up before the hay is shaken out and either thrown overboard or placed in a manure basket for that purpose; several accidents have happened owing to lengths of wire being left around. When the hay has been shaken out and is in front of the animals, each foreman should walk round his section looking carefully at each animal to see they have sufficient length of rope to reach the feed and enter in his book the numbers of any animals not feeding and report same to veterinary officer when he comes on his round. It often happens that an animal will not feed owing to being next to a mean, vicious one. Foremen should be on the look out for this and remove the vicious animal to the end of the line or to a single stall, and tie him in such a manner that although he can reach his food, he will not be able to savage the animal next to him.

Bran and Grain Feed.

In the ordinary course, unless otherwise directed, this feed should be given in the proportions of two of bran and one of oats by weight. Foremen will be given the quantities of bran and oats they should use for each day's feed and there being little or no variation in the weights of the bags no trouble will be met with in this matter. Feed mixing boxes should be placed in the most convenient parts of the deck, for preference alongside a hatch; into these boxes should be placed the quantities of bran and oats required for each feed and well mixed. The quantity of this mixture given to mules should be $4\frac{1}{2}$ lb., to horses 6 lb. at each feed. These weights are easily determined by using the pails to carry the feed to the animals. A full pail lightly pressed down weighs 9 lb. and therefore should feed two mules, and two full pails weighing 18 lb. should feed three horses. Before giving this feed, when the attendants are placing the tins in front of the animals they should see that every animal is tied up shortly so that they will be unable to rob each other of the feed. Experience has shown, especially in the case of mules, that unless the head ropes are shortened up some animals will proceed to empty the feed tin of a nervous, timid animal before beginning on their own tin. Only the exact quantity should be mixed for each feed and on no account should any be left in the mixing boxes for the next feed. Any of this feed left in the tins should be thrown away and on no account returned to the feed box. Foremen should know the animals that do not clear up this feed and report them to the veterinary officer who will give instructions with regard to the feeding of these particular animals.

Mucking Out.

Cleanliness on board ship is of as much importance as watering and feeding. The accumulation of the droppings of the animals is being continually soaked by the urine, the evaporation of which poisons the air which in turn poisons the poor beast doomed to breathe it continuously for fourteen to thirty days. It is a fact that most of the deaths which occur on board ship are due to pneumonia which is brought about and aggravated by the impure air the

animals have to breathe. It therefore follows that if a ship is kept thoroughly clean one of the causes of heavy losses is removed.

During the transportation of horses where the number of attendants is large, every stall on the ship should be thoroughly mucked out and disinfected every day, and during the transportation of mules, where only half the number of attendants is carried, one-half of the total number of stalls should be done one day and the other half the next.

When the weather is fairly calm the best plan is to take out three or four animals from one end of each line into the alley ways to give room to work. Then proceed to clean out these stalls, after which the animals adjoining can be moved along to the part cleaned. No animal should be moved out into the alley way unless there is plenty of matting down to give them a foothold.

While this work is proceeding foremen should look out for any lameness, swelled legs and sheaths or sore tails; make a note of them and report to the veterinary officer. When all the stalls in this line of animals have been thoroughly cleaned out and disinfected, the animals in the alley way should be moved to the other end of the line, so that every day each animal stands in a different stall.

The reason for this is that perhaps one corner of the deck may not be so airy as another, and it would not be advisable to keep an animal in a bad corner throughout the voyage. Again the little exercise is beneficial and foremen can discover complaints which might be overlooked if the animals were not moved. When all manure has been disposed of, the alley ways should be thoroughly swept clean and well sprinkled with the solution of disinfectant. In the case of decks having direct scuppers the alley ways should be washed down before being disinfected.

Scuppers.

These are a source of great trouble on board ship unless carefully watched. Owing to the construction of the bilges and pumps of ships it is necessary to have a very small perforated grating over each scupper pipe, and unless these gratings are continually watched and kept free the urine soon accumulates and difficulty is met with in getting it away, also small particles of the droppings float down through the gratings and often block up the pipe. This necessitates all urine being baled into buckets and being carried up.

Foremen should be ever on the watch that these gratings are kept clear and that at least twice every day a pail of clean water is flushed down the pipe.

No animal should be allowed to stand in a scupper stall and the scuppers should always be free of access. Careful attention to these matters saves much disagreeable, arduous, work, besides being beneficial to the health of the animals.

Getting up Feed.

The feed is generally carried in the foremost and aftermost lower holds of the ship which are generally below decks carrying animals. The foremen who are in charge of these decks must be responsible for the opening up and closing these holds. They should be the last men to get their feed up after which they must have the hatches put on and covered with the tarpaulin.

Foremen can arrange between themselves to work their men together to get up the quantity of feed required for each end of the ship. At least one day's feed should be always kept on hand on the decks to provide for very wet or stormy weather when it is not advisable to open these hatches, but care must be taken that this reserve on deck is used up in rotation so that the animals always get it fresh.

Day Watchman.

On no account is any deck ever to be left unattended. At all meal times one man in each section must be left to patrol the deck and arrangements made with the mess stewards to serve their meals hot when relieved, also when

the day's work is finished a man must be left in each section and foremen must arrange among themselves that two of them, one at each end of the ship, also remain to see that the watchmen are at their posts.

Every morning each foreman should hand a slip to the head foreman giving the names of their men who are on watch for the day in their sections also the two foremen who are to supervise them. This is a rule that will have to be strictly enforced as experience has shown that it is difficult to keep men on watch below especially when nearing or in port.

Night Foreman.

An important position on an animal transport is that of night foreman. He must be a man whose observation is keen, a strict disciplinarian and active. According to the number of men carried he will be given a certain number of watchmen and the sections they are to patrol during the night, and his duty will be to see that these sections are patrolled. At 7 p.m. when the veterinary officer makes his final round the night foreman must accompany him to receive instructions concerning any of the animals, and at least three times during the night the night foreman should make a similar round and carefully look at each animal. At every hour he must report to the officer on the bridge that his men are all on duty and, if he thinks necessary, call the head foreman or veterinary officer to any animal which, in his opinion, is not well. Before going off duty in the morning he must report to the veterinary officer. He should carry a sharp knife and not hesitate to cut loose any animal that may get caught or tangled up.

Foremen's Schedule.

Foremen must carefully read the foregoing instructions and see that they are carried out.

It is a good plan for foremen themselves to work to a schedule and the one following is given as a guide so that nothing is missed.

5.30 a.m. Call roll of men ; send for any absentees. See that all water barrels are filled. Look at scuppers.

6.0 a.m. Walk round section, note that every animal has a feed tin in front of him before giving order to water, after which walk round again.

6.15 a.m. Have tins removed and flush scuppers. Wash out barrels and refill. Shake out hay and feed. Tell off watchman for day. Walk round section, note animals not feeding and look to ropes.

6.30 a.m. Take men to feed hold.

7.45 a.m. Return to section, walk round and carefully note all animals. Again impress watchman.

9.0 a.m. Call roll of men, send for absentees. Walk round section, note every animal. Examine scuppers.

Commence mucking out: See that matting is down.

12.0 noon. See all barrels are filled. Walk round section, note every animal has a feed tin in front of him before giving the order to water, after which walk round again.

12.15 p.m. Have tins emptied and scuppers flushed. See that every animal has a tin for grain feed which should now be mixed and given, after which walk round section and see that all ropes are shortened up and the animals are feeding.

2.0 p.m. Walk round section, note animals that have not eaten feed, have tins removed and again impress watchman. Take turn supervising.

5.15 p.m. See all barrels are filled. Walk round section, note that every animal has a tin in front of him before giving order to water, after which walk round again.

5.30 p.m. Have tins removed, flush scuppers. Hay feed should be shaken out and given, after which walk round section, look to ropes and animal feeding. See that no man leaves until night watchmen come on duty. Wash out barrels and refill.

7.0 p.m. Attend section to meet veterinary officer on his final round.

overhauling generally takes place while the animals are on board. The plant, in addition, should be powerful enough to provide electric light on the horse decks at the rate of one 16 c.p. lamp for every 12 animals carried.

Fresh water tanks and bilges.—The allowance of 10 gals. of water a day for each animal during the voyage is a generous one. From notes kept on voyages during summer time in war, after allowance for wastage, viz., the pouring away of any surplus water left in the tins after the animals have had their fill, the washing out of barrels, and the flushing of scuppers, never more than 7 gals. a day were used for each animal. If animals are carried in holds on coal ballast, trunkways to the manhole covers of the tanks should be built so that the tanks can be cleaned out periodically. Ships, more especially those which take their fresh water from some river or lake, always accumulate a quantity of sediment in the bottoms of the tanks. This sediment, when the tanks are slack, during rolling becomes mixed with the water so that it has the colour of pea-soup and horses have refused to drink it. While a ship is carrying animals, the tanks should be cleaned out and cement-washed at least once every three months. Trunkways should also be built to the bilges in the holds carrying animals on coal ballast, and it is advisable to have perforation at the top of the sides of these trunkways to carry off water and urine which has been known to collect on the top of the coal. It is of the utmost importance that the bilges which receive the urine from the decks should be easy of access, as fine particles of manure float down the scupper pipes and often choke the rose-boxes so that the engineers are unable to pump out the bilges. Every ship should have a large fresh-water tank fixed on the highest deck to supply the different decks that carry animals with their drinking water. The tank should be fitted with an overflow returning to the tank in the ship's bottom to prevent bursts and waste should the pumps be working and all valves on the horse decks shut off. There should be two distinct outlets with valves from the tank, one to supply the forward and one to supply the after end of the ship. The size of these outlets should be at least 3 in., which can be reduced to 2 in. as the branches go off to each deck. With only one outlet and uniform sized pipes there is always a difficulty as regards the watering of animals on the horse decks. The lowest decks and those nearest the tank get water, and the extreme forward or after decks are unable to obtain their supply, so that, unless the precaution is taken that every barrel is filled immediately after use, it is most likely that some animals will not get water at the proper time; in fact, unless carefully watched, they will often miss it. There should also be fitted to this tank a fair sized steam jet to prevent freezing during extremely cold weather such as is experienced in Boston, New York, and Portland, during winter.

Fitting up horse-ships.

It has been conclusively proved that animals travel much better and land in better condition when transported loose in pens than in separate stalls, and that, with the exception of fitting up 5 per cent. single stalls on different decks to accommodate vicious animals, the single stall type of fitting can be dispensed with in every part of the ship, weather-deck included. Pens can be fitted according to the space at disposal to accommodate from 4 to 8 animals each, a space of 2 ft. 6 in. or thereabouts, say a minimum of 2 ft. 3 in. being allowed for each animal. The length, or rather the depth, of the pen should be as much as possible over 8 ft. 0 in., provided that the alley-way in front is not less than 5 ft. 0 in. It often happens in certain parts of a deck that there is not enough width to get two rows of pens and an alley-way of sufficient width for working purposes; in these cases there is no reason why the pens should not be 10, 12 or even 14 ft. deep and so allow the animals the greatest possible space to move around, much to their advantage and well-being, to say nothing of their being able to place themselves in the easiest position to withstand the rolling of the ship or lie down for relief from the continual standing.

Structure of Fittings.

Fittings are comprised of :—

- (1) Floorboards or platforms.
- (2) Cant rails.
- (3) Stanchions.
- (4) Breast boards.
- (5) Parting boards.
- (6) Backs of stalls.
- (7) Breast board brackets.
- (8) Batten grooves for parting boards.

1. *Floorboards or Platforms.*—These have proved to be a great disadvantage from many points of view, and their abolition is advocated. The droppings get trodden between them and prevent free drainage; they become soaked with urine and are a constant source of foul air; being sodden, the wood becomes soft, and the screws of the battens draw out in rough weather and become a source of danger to the animals' feet. The battens even when fastened with bolts, have been known to come adrift. The horse attendants do not care to lift them when they muck out the ship, and on several occasions refused to do so, a fact which has necessitated prosecutions at the end of the voyage. They are costly, needing constant renewal and repair; they are slippery even when cleaned, because they are thoroughly soddened, and it is not advisable to sprinkle ashes on them on account of the scuppers getting blocked—in fact, they have no advantage whatever. The cement floor is preferable in every way; if well laid and the battens are fixed in a proper manner it is more durable, less costly and better from a sanitary point of view. It is not necessary to cover the whole of the decks with cement, but only the areas in the pens where the animals stand, leaving a space to form gutters from the alley-ways to the scuppers.

2. *Cant rails*, of which there are two on some decks, are known as front cant and rear cant. They are wooden beams or timbers 6 in. deep and 4 in. wide, which are bolted to the deck to secure the bottom ends of the stanchions. For preference, they should be of hard wood to withstand the animals' teeth; if hard wood cannot be procured, they should be covered with zinc or galvanized iron. They should be continuous the whole length of the pen until opposite a scupper.

3. *Stanchions* are the uprights forming the front and back of the pens. They should be sound deal, not less than $4\frac{1}{2}$ in. by $4\frac{1}{2}$ in., finish-bolted at the bottom to the cant rails and to the beams of the deck head. For preference 5 in. by 5 in. dressed timber with chamfered edges covered with zinc or galvanized iron should be used.

4. *Breast Boards.*—These are deals which form the front portion of the pens and are fitted (not fixed) into brackets on the stanchions so that they can be lifted out at any time. They are made of 9 in. by 3 in. yellow deal rounded on top edge and covered with zinc or galvanized iron. They are usually the width of two stalls. Their height from floor of pen should not be more than 3 ft. 9 in.; at each end where they fit into the brackets they should be notched for 1 in. to prevent any lateral movement. At the present time they are held in position in the brackets by a swinging button of wood screwed on the front of the stanchion. This method is not at all satisfactory, as the button is often moved to one side by the animals and the breast board is lifted out when the animals have their heads under it feeding from the floor. A suggested fixing will be described under breast board brackets.

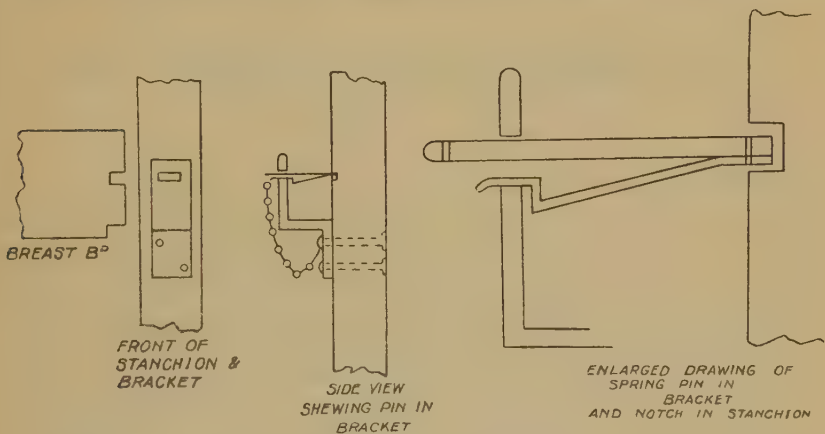
5. *Parting Boards.*—These are deals 9 in. by 2 in. which are fitted into grooves* fastened to stanchions and backs of stalls and form the ends of the pens or divisions as the case may be. Should the pens be made deeper than 8 ft. 0 in., a centre stanchion should be fixed, or the thickness of the board should be increased to 3 in. They are four in number, each having a 2 in.

* It is important that these grooves should be sufficiently deep to prevent the boards springing out in rough weather.

block fixed towards each end, so that when the boards are in position there is a 2 in. space between them. This provides for a free current of air. The top parting board should be covered on the top edge with zinc or galvanized iron.

6. *Backs of stalls.*—This is a smooth sheeting of 2 in. tongued and grooved boarding securely nailed to rear stanchions or where the rear part of the stall comes against the ship's side to uprights securely wedged between the ribs of the ship. The height should not be less than 5 ft. 6 in., and the top should be covered so that there is no space between the backs and ship's side. This is most necessary as attendants, rather than carry the manure away, have been known to fill these spaces, and mules have been known to get their feet fixed in them.

7. *Breast board brackets.*—These are stout iron brackets $\frac{3}{4}$ in., forged in the shape of a step and fixed to the stanchions to carry the breast board. In the bottom riser of the step they should be diagonally holed for $\frac{3}{4}$ in. bolts; the upper riser of the step should be slightly rounded off at the top and edges. It is in this top riser that the suggested fixing is made for the breast board, as illustrated in the accompanying diagram:—



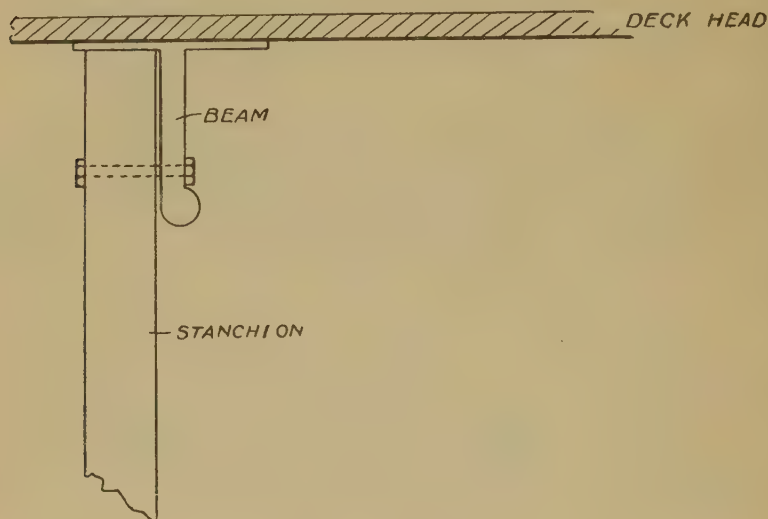
An oblong slot is cut in the top part of the bracket to take a flat spring; each breast board has a slot to correspond. There is also a notch in the stanchion opposite the slot in the bracket to take the end of the pin when in position.

8. *Batten grooves for parting boards.*—These are 4 in. by 3 in. quartering having a 2 in. groove on the 4 in. surface, which are securely nailed to backs of stalls and stanchions to carry the parting boards. The tops should be levelled and smoothed and the sides chamfered. A spare stock of these should always be carried on the ship to enable the conducting officer to fix up a temporary loose box in any part of the ship from which an animal is enabled to move. Several lengths of parting board should also be carried as spares, care being taken that they are of sufficient length to meet the requirements of any size of pen.

Fitting up the ship.

The first thing to be done is to plan out the pens and stalls in each deck, taking care that no animals are arranged to stand in front of any of the scuppers. The cant rails should then be bolted to the decks at intervals of not less than 6 ft. 0 in. The stanchions may then be fixed at the back of the cant rail by a single $\frac{3}{4}$ in. bolt. As far as the position of the stanchions is concerned, it is not necessary that they should be a uniform distance apart, because the heads or tops may not come close to a beam if they are so placed. It is usual to place them about two stalls apart, that is, 5 ft. 0 in. If this is strictly adhered to, it becomes necessary to have a top cant or rail to fix them.

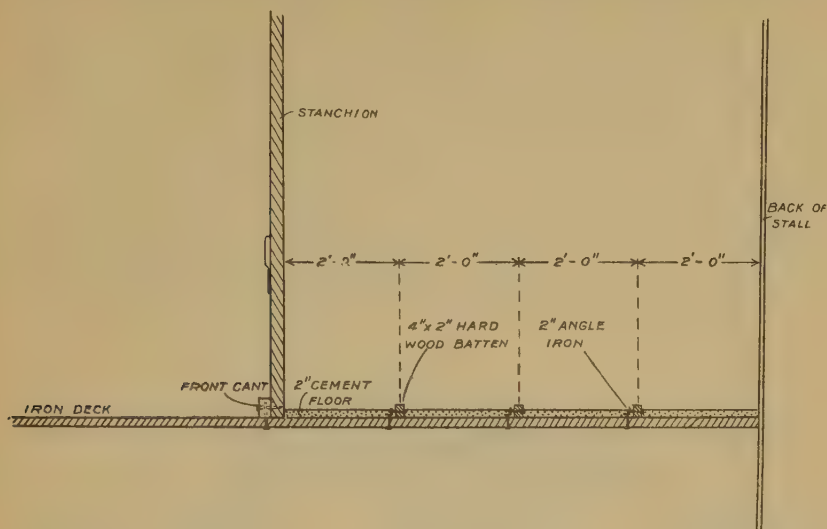
The fixing of this top rail in low decks is a serious defect and the cause of many cases of poll evil: the animal is feeding and someone walking past him causes him to throw his head up, with the result that he receives a smart blow on the poll, which often has disastrous results. The stanchions should be bolted through the beam on the deck-head as shown below:—



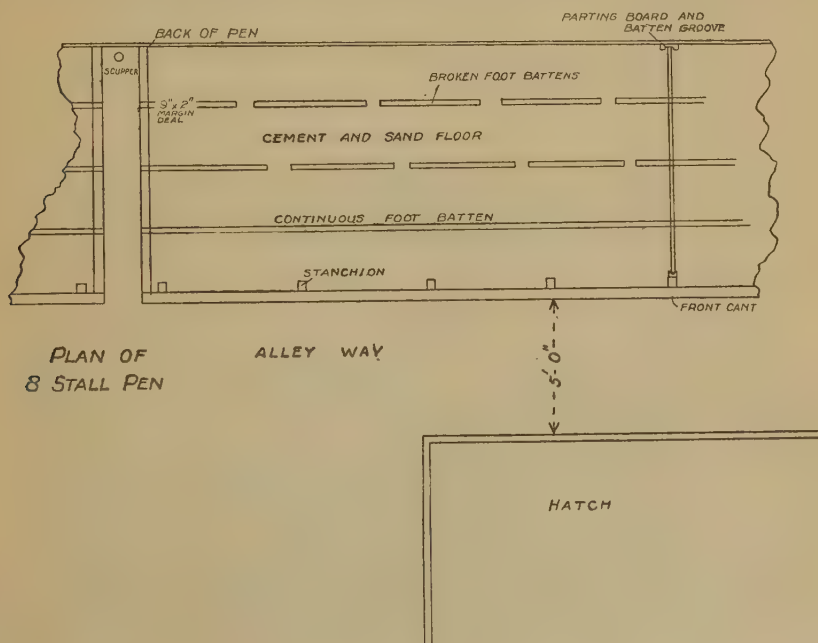
This makes them absolutely secure and does away with the fixing of stays which, unless bolted, come adrift and fall out, leaving the stanchion free to be pushed over. Deck beams are not very far apart, 2 ft. 6 in. at the most, so the stanchions will not be far out, one or two a little narrower in one place and wider in another. The value of this method of fixing the upper end of the stanchions far outweighs any fault which may be found in appearance. Again, by the use of a little give-and-take in this matter, it is often possible to obtain space for another animal. After the backs of the stalls are fitted, as described under that heading, the floor can be laid. According to the depth of the pen, that is to say, the distance from the front to the back, small clips or short lengths of 2 in. angle iron should be bolted to the deck to fasten the foot battens to. The upper portion of the clip or angle iron should be suitably holed for bolts to fix the foot batten. On the floor boards now in use there are four rows of battens, but these are not necessary. In an ordinary 8 ft. 0 in. stall only three are required, and these are fixed at 2 ft. 0 in. centres as shown in the rough drawing below.

The front batten can be continuous the whole length of the pen, but the centre and back batten should be broken for 6 in. every 6 ft. 0 in. to allow the urine to run to the back of the stall. When the pen reaches a scupper a 2 in. by 9 in. deal should be fixed flat on the deck to cant rail and back of stall; also the floor battens should be notched to run over the top of this board and be screwed to form a margin for the gutter leading from the alley way to the scupper. This will prevent the floor getting chipped and at the same time form a break in the cement and prevent its cracking. The floor battens should be of hard wood—4 in. by 2 in. (oak); it may be a little expensive at first, but it pays in the long run inasmuch as they do not require to be often renewed. The cement floor should be composed of two parts of clean sharp sand to one of tested cement, well mixed and floated in, then brought to a rough surface with wooden floats. This surface gives a much

better foot-hold to unshod horses than the slippery sodden floor boards now in use, is easier to keep clean, and permits of an occasional flush down in

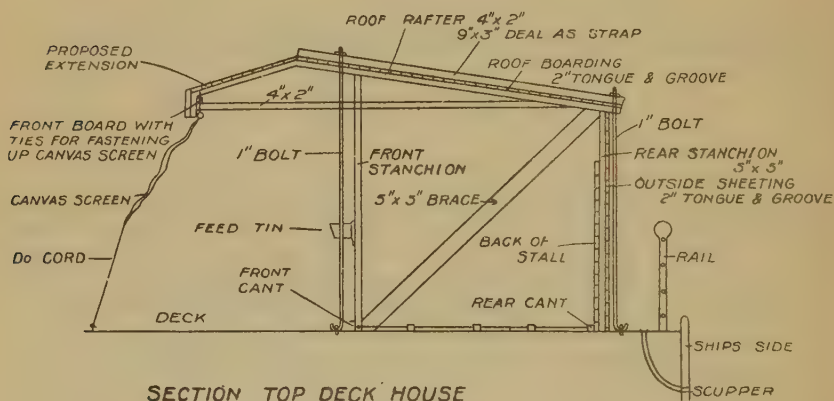


the lower decks and a daily one where scuppers are directly over the side. Objection may be taken to this surface that the animals, being unshod, might break their feet, but when the shoes are removed for transportation the toes could be easily rasped down to a small level to prevent this. Below is a rough sketch of a plan of a pen showing the details mentioned above:—



Top deck fittings.

When animals are carried on the exposed or weather decks it is advisable to have the stalls and pens erected in the form of separate deck houses, quite independently and a little distant from the ship's side, one reason being that the weight of a wave running up the ship's side is broken before it reaches the pen, and another the advisability of having the scuppers easy of access. If the houses are built continuously the whole length of the deck, strong braces should be fixed athwart the houses at different intervals, say every pen of four animals, that is 10 ft. 0 in. There should be an extension to the roof over the animals' heads, as shown in the sketch, to protect them from rain and spray, and the canvas screens should be so arranged that the attendants can work under them. Eye bolts should be fastened to the decks and the houses securely strapped down at the points where the braces are fixed.



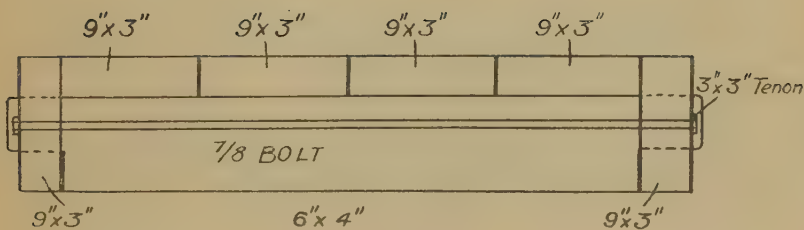
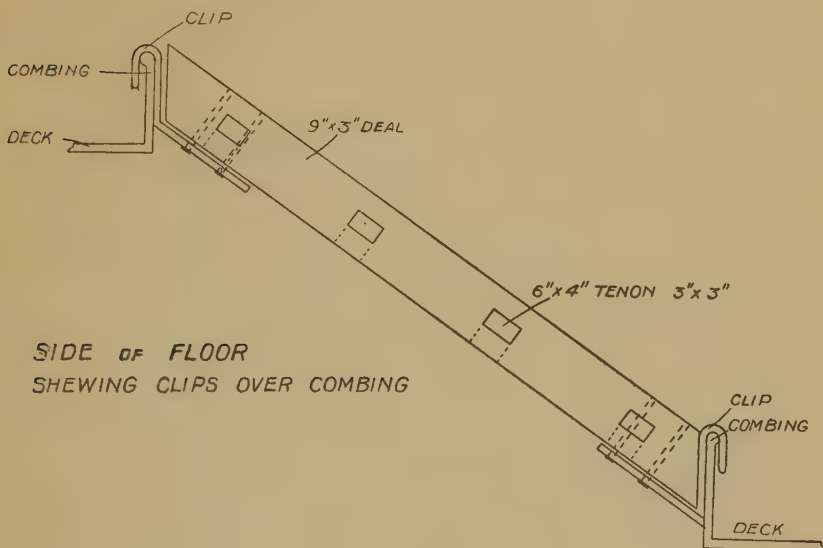
Whichever way the houses are built, it is absolutely necessary for the scuppers to be easy of access and for strong braces to be worked in at short intervals.

Brows.

These are ramps or gangways used for animals passing from one deck to another, and should in all cases on weather decks be built in such a manner as to be easily dismantled and re-erected. The structure should consist of three parts, viz., the floor and two sides, each of which can be quickly detached from each other. The floor should be made up of 9 in. by 3 in. deals of sufficient length to reach from the top of the combing of the upper hatch to the combing on the opposite side of the hatch below. Two outside deals should be mortised and framed together with four 6 in. by 4 in. deals having a 3 in. tenon, as shown below, and firmly held together with two $\frac{3}{4}$ in. bolts. On top of this framing, in the 3 in. recess formed by the 6 in. by 4 in., the remaining 9 in. by 3 in. deals, four in number, should be placed, as shown. This will then make the floor 3 ft. 6 in. wide out to out.

The outside deals should have two forged clips, fixed as shown above, made of 2 in. by $\frac{7}{8}$ in. bar secured by bolts, to clip over each combing. Where the hatches are over the lower hatchway, the lower set of clips will not be necessary, as the lower end can just rest on the hatches.

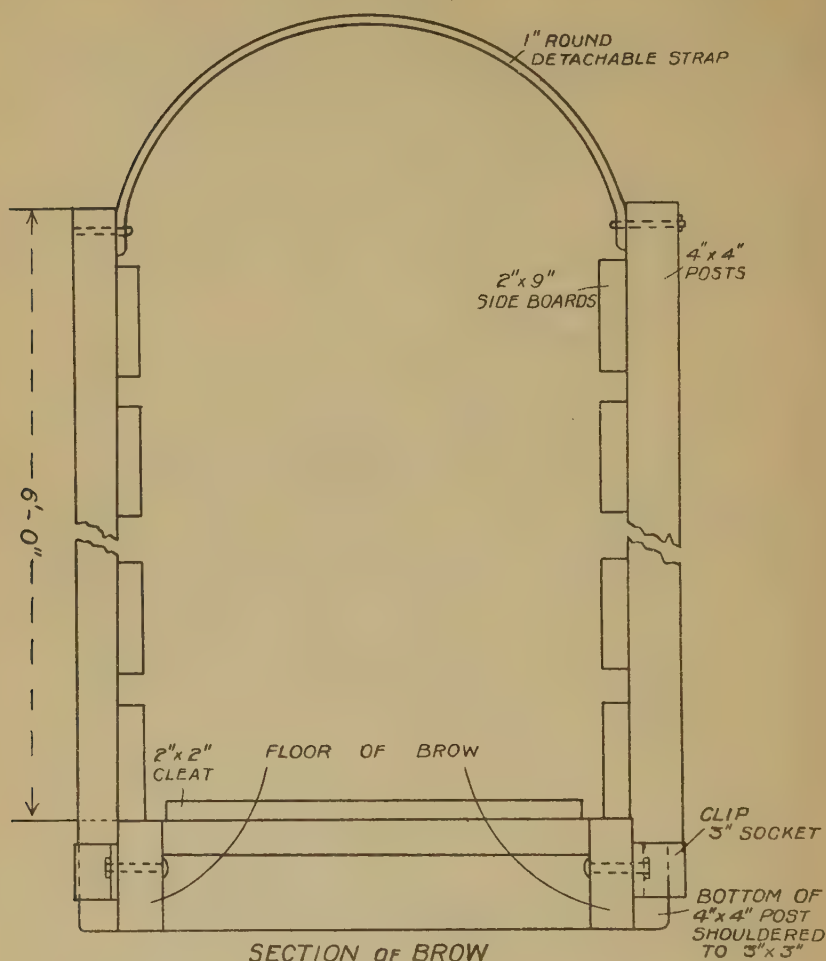
There now remains the sides of the brow to construct. These can be made with 4 in. by 4 in. posts with 2 in. by 9 in. deals bolted to the insides. The 4 in. by 4 in. posts should be shouldered on three sides to drop into a



SECTION OF FLOOR

clip bolted on the sides of the floor deals. The two sides can then be strapped across the top with a half circular strap, the whole being shown in sectional diagram on following page.

Across the floor at spaces of 15 in. should be bolted 2 in. by 2 in. hardwood cleats, leaving a margin at each side to allow water to drain down. This



type of brow allows the two sides to be lifted out and the floor to remain. If two slots are cut in the upper hatches to clear the top clips of the floor, the hatches can be easily and quickly battened down.

Water Supply.

One of the most important items in fitting a ship for animals is the installation of an adequate supply of drinking water on all decks; the less distance the attendants have to carry the water to the animals the better chance the animals have of getting their full quantity. The attendants on remount ships cannot be made to realise the importance of an animal's getting all the water its system calls for, and it follows that, if the work of watering is at all arduous, the animal often goes short.

When the pens and stalls have been set out, the water service should be so arranged that there is a valve to supply two 40-gal. casks in a position nearest to every 24 animals, care being taken to ensure that if on any deck the number of animals does not reach the point to tally with the casks, an extra cask is installed.

Experience has shown that casks are the best receptacle from which to carry the water to the animal. The 40-gal. variety is most suitable. After each watering they are almost empty, and the little water which remains in the bottom can be used to swill them round and clean them out, thus bringing the wastage of fresh water down to the smallest quantity. The water service should also be so arranged that when the valves at the tank are shut the whole of the pipes can be drained. This is important during frost, as a failure of the water supply through bursts is a most serious matter on a horse ship.

Ventilation.

So important to the well-being of the animals is an abundance of fresh air that every possible means should be employed to obtain it, and any expense is justified.

Every hold or deck usually has an iron ventilator running down from the upper deck to the deck head; these more often than not, instead of forming a fresh air inlet, act as an outlet for a portion of the hot air which rises from the compartment in which the animals are standing, but unfortunately they are not large enough to remove all the foul air. The circulation naturally follows the line of least resistance, and at the floor level much foul and stagnant air accumulates. Experience has shown that these ventilators can be usefully employed as inlets if they are continued from the deck head to within a foot or 18 inches of the floor, by means of wooden shoots fixed under them. Care must be taken to ensure that the shaft is continuous through all the decks to the upper cowl and that there are no breaks in the intervening decks. A natural ventilation then takes place, the hatches forming the uptake from which fresh air is drawn down these ventilators; the process is considerably assisted if the cowls on top are kept to the wind.

In decks where the animals are carried any distance beyond 20 ft. from a hatch an electric blower should be fixed to blow fresh air in to the furthestmost corners. Experience proves that it is better to pump fresh air into a deck than to extract the foul. Extractors do not fetch all the foul air out; the circulation set up by an extractor naturally follows the line of least resistance, whereas, if fresh air is pumped down to the floor level, the warm air rises naturally and the hatch becomes the uptake.

Windscoops and canvas windsails should be supplied in abundance to every ship. An improvement on the old self-trimming windsail has been devised, the bottom of which, when fixed to wooden shoots, can be made to carry fresh air to almost any part of a hold or deck. It is advisable to get as much air as possible to the holds and lowest decks, in order that the air which from these decks rises and is necessarily diffused through the intervening decks may be as fresh as possible. The rough sketch below will show the idea of these windsails and wooden shoots.*

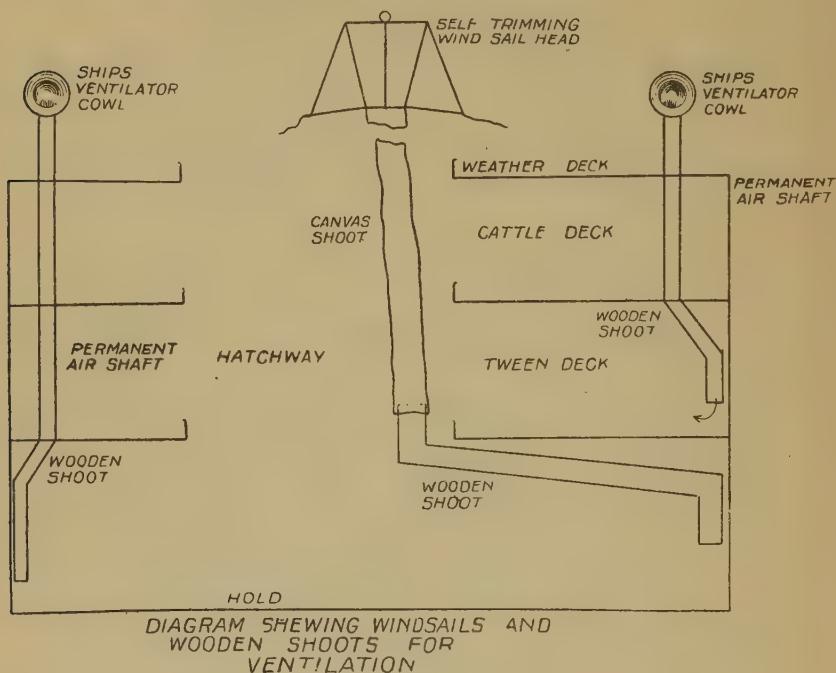
Care should be taken to ensure that wire stays with suitable blocks attached are fixed between the ship's masts for pulling up and lowering the windsails, four of which should be provided for each hatch if animals are carried below.

The importance of providing electric blowers or fans becomes evident after a day with wind following the ship at about the same speed as she is steaming. Then, unless blowers are installed, it is impossible to ventilate some of the corners in the lower decks. Under these conditions it is also essential that there should be facilities for moving the animals to the upper decks, and for this purpose the brows should always be available.

In dead calms ventilation is affected by the rate of progress of the ship, and for this reason speed is important in increasing diffusion of air as well as in shortening the voyage.

* See p. 740.

Thermometers should be fixed in the bad corners of every deck and their readings carefully watched by the officer in charge of the animals. The temperature should not rise more than 10° above the outside shade temperature if the animals are to be kept in good health.



Pens on hatches.

Where cargo is carried in the lower decks, valuable space on the hatches can be utilised by forming them into pens, which may be used for spare stalls and loose boxes for animals suffering from swollen legs and sheaths. After the hatches are battened down, strips of cocoanut matting should be stretched across the tarpaulin and fixed under the battening irons; wooden stanchions can then be wedged between the deck and deck head and parting boards nailed to them to form a barrier or fence. This has been found to be invaluable during long voyages lasting 25 to 30 days. The pens not only facilitate mucking out by allowing the movement of a large number of animals from the stall pens, but are also useful for colic boxes, and places to put animals needing fresh air when certain parts of the ship are foul. It is surprising to notice how well animals keep their legs on the matting in these pens during fairly heavy rolling. During a long voyage there are frequently dozens of very weary animals who are greatly benefited if they are a day or two in these pens so that they can lie down and rest.

Subordinate Staff.

One of the greatest trials which the conducting officer had to face was the staff provided to attend to the animals. It could not at any time be expected that a reliable man would work for the money paid to these attendants, especially as they were paid off while the ship was in port. As the pay was so small, many of the men collected as attendants were "work-shys," wasters, and in some instances gathered up from the gaols, men whose

only object in life was a meal and a bed for the least possible exertion. An instance of the pay will illustrate the point. A ship left Boston on November 18th, 1917, with a staff composed of under-foremen at £5 for the run, and horsemen at £4 for the run. The voyage to England lasted until December 6th, being 19 days on the voyage with animals. The ship was in England until December 20th, when she sailed back and arrived in Boston on January 8th, 1918, the whole voyage having taken 52 days, for which the under-foremen received £5 and the horsemen £4, the foremen receiving about 1s. 11d. a day and the attendants about 1s. 6d. It was obviously not likely that a very good class of man would come forward and take the risks involved. Again, it was with the greatest difficulty that a conducting officer was able to keep a decent under-foremen even when one was procured; consequently on almost every voyage there were fresh men unused to the routine, and by the time they had learned it, sometimes at the expense of a valuable animal or two, the voyage was over. It would have been more satisfactory if the head foreman and assistant foreman at least had been engaged at home and borne on the ship's articles, well paid and subject to home discipline. Their extra pay would have been saved over and over again by getting a fair day's work out of them on the return voyage, cleaning and disinfecting the ship, repairing and making ready for a fresh load of animals.

The actual number of attendants allowed, though usually less than the establishment suggested below, would have been sufficient for all the necessary duties if the men had been employed under conditions likely to ensure their doing a fair day's work.

With the following staff, adequately paid, there should be no bills to meet at the end of the voyage except that for any new timber required for the fittings :—

- 1 head foreman.
- 1 assistant foreman for each 100 animals.
- 2 carpenters for each 100 animals.
- 1 attendant for each 15 animals.
- Mess-boys and cook's assistants, extra.

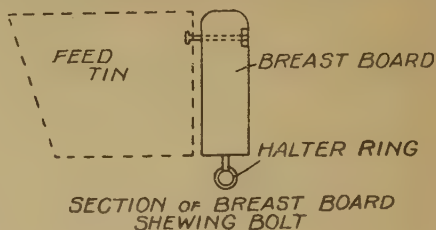
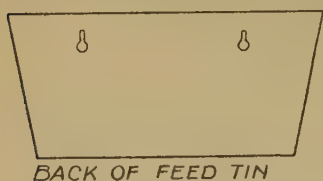
Gear required.

- Feed mixing boxes of sufficient size in every deck, one on each side.
- 2 buckets for every attendant (with a suitable number of spares).
- 1 wire brush for each attendant.
- 1 white-wash brush for each attendant.
- 1 dandy brush for each attendant (with a suitable number of spares).
- 1 curry comb for each attendant.
- 1 shovel for every 2 attendants.
- 1 dung fork for every 2 attendants (with a suitable number of spares).
- 1 stable broom for every 2 attendants.
- 1 dung bucket for every 2 attendants (with a suitable number of spares).
- 1 garden hoe for every 2 attendants (with a suitable number of spares).
- 1 40-gal. cask for every 12 animals, with spares.
- Sufficient rugs, with spares, to clothe animals on exposed decks.
- 1 feed tin with 20 per cent. spares for each animal.
- 3 sets of slings and $\frac{1}{2}$ doz. beam hooks or rings.
- 1 water-sprinkling can for every 100 animals, and spares.
- 1 hatchet for every under foreman, and spares.
- 1 electric torch, with refills and lamps for head foreman and assistant foremen.
- 1 doz. candle lanterns, with supply of candles.
- 1 or 2 rolls of cocoanut matting.
- 1 gallon of disinfecting fluid for every 4 animals.

Feed tins.

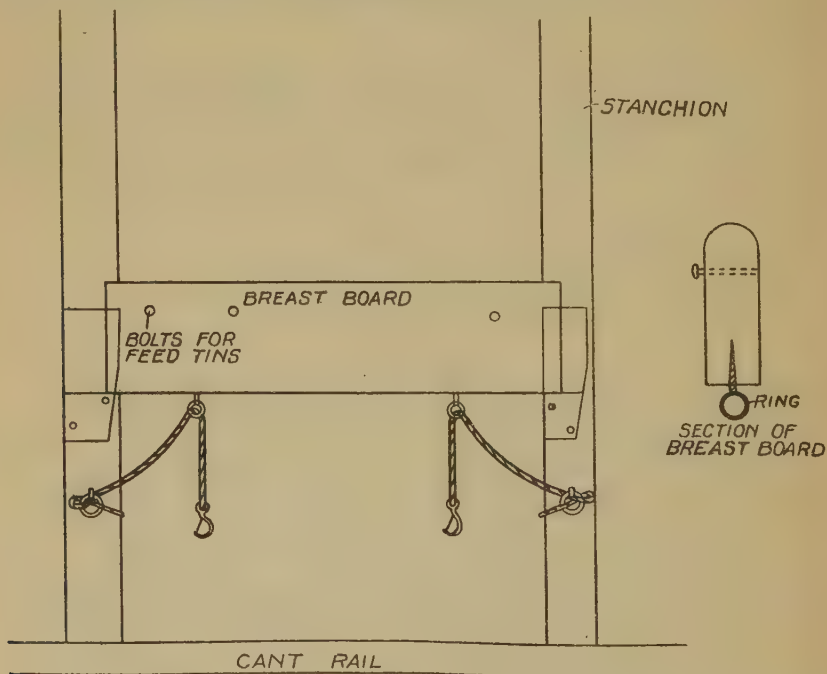
The method of hanging the feed tin over the breast-board needs alteration as it leads to considerable waste of food and water owing to the animal being able to throw it down. It has been suggested that the tins should be slotted

to fit into bolts fixed to the breast-boards as shown below, which would obviate this. This would prevent a quantity of food being wasted during each voyage.



Securing animals during feeding and watering.

A new arrangement for securing animals during feeding and watering has been tried with excellent results, the animals being unable to loot or reach each other's tins. The rough sketch below illustrates it.



The ring on breast board, it will be noticed, is screwed in the centre of the under surface.

APPENDIX D.

ARMY COUNCIL INSTRUCTIONS.

I.

ACTION TO BE TAKEN TO PREVENT THE SPREAD OF CONTAGIOUS DISEASES FROM ARMY HORSES AND MULES TO HORSES THE PROPERTY OF CIVILIANS. (A.C.I. 174 of 1916.)

1. It is notified that serious representations have been made by the Board of Agriculture on behalf of agriculturists and other equine stock owners, regarding considerable injury sustained by the latter in consequence of the infection of their horses from army horses and mules suffering from pneumonia, strangles, catarrh, influenza, mange, etc.

2. It is further notified that the claims for compensation in respect of death and disablement of horses thus infected from army sources already amount to a large sum of money.

3. With these facts in view, it is requested that greater care will be exercised in future than has been in the past by Os.C. units, veterinary officers and others concerned, when army animals are necessarily quartered on farms or in buildings, the property of civilians, in order that both private individuals and the State may be more adequately protected from unnecessary loss and expenditure.

4. The following instructions will be duly observed :—

- (a) Prompt warning to be given to civilians concerned when any form of contagious disease is detected amongst army animals quartered upon them.
- (b) Such cases to be removed at once from possible contact with or proximity to private horses. In this connection it should be noted that the contagion of influenza is considered to be air-borne, so that it will not suffice to remove horses to a different stable under the same roof.
- (c) Affected cases to be watered from buckets, and in no case to be allowed access to watering-troughs used by horses the property of civilians.
- (d) Horses having an obvious nasal discharge or bad cough to be considered as affected with contagious disease for the purpose of these instructions.
- (e) Notice to be given forthwith to the nearest local authority as to the locality of every existing permanent and temporary veterinary hospital, and to be given without delay in future in the case of any further centre for the treatment of sick horses that may be established.

Eastern 16/2675 (V.D.).

II.

THE RESPONSIBILITIES OF REGIMENTAL OFFICERS WITH REGARD TO PREVENTION OF MANGE AMONG ARMY HORSES. (A.C.I. 457 of 1916.)

1. In view of the serious increase of mange among army horses and consequent grave interference with mobilization arrangements, the following memorandum has been drawn up for the information of all officers concerned with the care of army animals.

2. Officers commanding should take steps to ensure that the contents of the memorandum are mastered, and that the principles laid down therein are duly observed by their subordinates.

116/Gen. No./6271 (V.D.).

Memorandum

1. It has been brought to notice that Os.C. mounted units and transport officers of infantry battalions do not in many cases realize their responsibility as regards outbreaks of mange in horses under their charge. There is a dangerous and regrettable tendency to assume that the veterinary officer, and the veterinary officer alone, is responsible for the freedom of the horses of a unit from mange. This is contrary to fact and leads to disaster. Mange may and does appear, with incredible swiftness, at a time when the veterinary officer is absent on other duty, and to adopt a policy of *laissez-faire* till he arrives is to give this insidious disease every opportunity to spread, as spread it surely will. Moreover, it is impracticable to expect a veterinary officer to inspect each horse in his veterinary charge individually every day. A medical officer in professional charge of a thousand men is not expected to achieve this tremendous daily task of individual inspection, but in his case he is assisted by the ability and readiness of a man to draw attention to his personal ailments. The veterinary officer has no such assistance and is therefore bound largely to rely upon decentralization, whereby regimental officers draw his attention to any departure from normal health of a given horse, and, in the case of mange, take necessary precautionary measures. The importance of mange is enormous in war. Its unchecked ravages will decimate the horses of an army and will hold up all mobilization. The symptoms of mange are clear and generally unmistakable, and are capable of being detected by any intelligent individual who will take pains to obtain from a veterinary officer a simple demonstration of the salient features of the disease. In order, however, that there may be no excuse for ignorance in the matter the following brief description of the disease is given.

2. *History*.—Mange is a highly contagious disease due to the presence of a microscopical insect parasite of the mite order, one principal variety of which lives and propagates its species on the surface of the skin (psoroptic mange), and the other by burrowing tiny channels just under the surface (sarcoptic mange).

Both varieties are practically invisible to the naked eye, and both propagate their species by laying eggs.

3. *Infection*.—Infection is conveyed from horse to horse by transfer of the actual parasite, or of its eggs, through the agencies of physical contact, rugs, saddlery, grooming tools, bedding, etc.

Infection is greatly facilitated by dirt, hence units in which grooming is slack are notoriously liable to mange.

Mange in racehorses and hunters where grooming is thorough is almost unknown.

4. *Symptoms*.—The first symptom is intense itchiness of the skin. The horse rubs himself vigorously against the nearest convenient object. In due course, chiefly as a direct result of such rubbing, a patch of hair is removed and the skin appears bare and often red in places from skin abrasion. If a patch of infected skin is rubbed hard with a piece of wood or a coin the horse manifests pleasure, twitching his nostrils and lips and stretching out his neck.

5. *Prevention*.—(a) The first fundamental principle is the immediate isolation of the horse, together with all that pertains to him, including rugs, saddlery, grooming tools and nosebag. Nothing should be overlooked.

(b) The next principle is identification and careful noting of the horses that have been in contact with the case, for the information of the veterinary officer.

(c) The third principle is cleansing and disinfection of the standing occupied by the case, all sweepings being burned or removed to a safe place.

(d) The fourth principle is information to the veterinary officer of all that has been done. The horse then ceases to be a source of danger pending verification or otherwise of the disease by the veterinary authorities.

6. If the regimental officer carries out the above principles he will have done more towards the suppression of mange than all the veterinary science in the world can accomplish if these principles are neglected.

There is nothing in the practice of these principles beneath the dignity, or above the intelligence, of any officer, and their exercise should be strictly enforced by all C.Os.

III.

MORTALITY AMONG ARMY REMOUNTS AND MEASURES TO BE TAKEN TO PREVENT IT. (A.C.I. 1168 of 1917.)

In order to prevent mortality among horses in remount depots, permanent and temporary, and among remounts recently posted to units, it is necessary that the following instructions should be strictly observed :—

For further explanation reference should be made to the memorandum printed below.

1. From September 1st, 1917, the temperature of all animals in remount depots and of all remounts for one month after being posted to units will be taken and recorded each day.

2. Any animals found to have a temperature of 101° F. or over will remain at rest pending veterinary attention and disposal.

3. A certificate signed by the O.C. the unit and the veterinary officer in charge stating that all temperatures have been recorded daily, and giving a return of the total number of high temperatures thereby discovered during the month, will be rendered at the end of each month to the headquarters of the command concerned.

4. Except as provided hereunder no army remount will be despatched by rail on a journey exceeding fifty miles within twenty-one days of accomplishing a former rail journey, unless the exigencies of the Service render it absolutely necessary. This rule is not applicable to remount depots which are reception depots for animals arriving from overseas or embarkation depots for animals proceeding overseas, but the principle should be observed as far as possible, and extraordinary vigilance should be practised in the veterinary inspection and temperature taking of animals that it is not possible to detain.

Memorandum.

The mortality among army remounts is many times greater than that among new entries in civilian racing, hunting, and most commercial stables.

At least 75 per cent. of this mortality is attributable to respiratory diseases culminating in pneumonia. Before pneumonia can be established in a horse there is a preliminary period of time of varying duration in which a high temperature is often the only evidence of disease to the unskilled observer. Only the skilled observer, or an attendant who is well acquainted with the physical peculiarities and habits of his horse, is able to detect the slight symptoms of malaise which coincide with this high temperature.

If the disease is detected in this early stage, and the horse kept from any work, exercise or excitement, pending veterinary attention, pneumonia will generally be prevented, or at the worst, the subsequent developments will not be serious.

On the other hand, if the preliminary symptoms escape notice, and the horse, being in a state of high temperature, is worked, exercised or despatched upon a rail or sea journey, a severe attack of pneumonia, ending in death, is the common result.

Early detection of disease is usually ensured to most horses in civil life by the following factors :—

- (1) Liberal supply of skilled attendants, as in racing stables, where there is, as a rule, one experienced man or lad in *whole time* attendance on every two horses.

- (2) *Continuity* of attendance and circumstances whereby each man gets to know thoroughly the physical peculiarities and habits of his horses, and is thus quick to detect any slight departure from normal health.
- (3) The financial, working, or sporting value of the horse which ensures the close personal attention of his owner.

The foregoing factors must in the nature of things be largely lacking in military establishments, as a little reflection will show.

It may then be stated that the early detection of disease is to a great extent not ensured to army horses by reason of the necessary absence of the foregoing factors.

In addition, another important item of military ownership tends notably to augment disease and mortality among army horses as compared with civilian-owned animals. This item is repeated change of environment effected by rail and sea journeys. A rail journey profoundly excites and disturbs horses which are not accustomed to this mode of conveyance. Thereby the resistance of the animal to pneumonia is greatly lowered, so that the disease often follows a rail journey. The C.O. of nearly every mounted unit has observed this extraordinary tendency to sickness among remounts transferred to his unit from a distant station, necessitating a rail journey of several hours.

The cry is "infection," but the results of recent exhaustive research into equine pneumonia all go to show, not only that infection in the ordinary sense of the word plays a far less important part than has hitherto been assigned to it, but that it is doubtful whether horse-to-horse-infection occurs at all, so far as this disease is concerned.

Auto-inoculation does take place, but this phenomenon, though of deadly significance, has nothing to do with "infection" in the popular acceptation of the word.

For all practical purposes, then, it may be said that the animal develops a high temperature and pneumonia in direct consequence of the excitement and change of environment occasioned by the journey. Army remounts are subjected to railway journeys at brief intervals to a greater extent than civilian-owned animals under less careful conditions of management than the latter, and the proportion of respiratory disease among army remounts is thereby increased in definite ratio with this increased and less careful traffic.

To reduce the mortality, therefore, among army remounts it is necessary to discover and enforce some means which will in part, at least, replace the more interested attention and more fixed circumstances enjoyed by horses in civil life. Routine daily temperature-taking with the clinical thermometer provides a simple, mechanical, and practical means of detecting respiratory disease (pneumonia) in its early stages.

If this is enforced and every horse found to have a temperature of 101° F. and over is kept from any work, exercise, or journey, pending veterinary attention, then the mortality among army remounts of the future will, other things being equal, be reduced by a very important amount.

If further than this it is arranged and enforced that no army remount shall be subjected to any rail journey of more than fifty miles within twenty-one days of enduring a previous rail journey, then mortality will again be reduced by a very important amount.

With a little practice, any man of normal ability can take the temperature of an ordinary army remount in two minutes, i.e., about the same time as he would require to "pick out" a horse's feet or perform other minor details of the equine toilet. The latter operations though hygienically desirable are not to be compared in economic importance with routine temperature taking, which will save the lives of a great number of horses every year. Therefore, as it has been found possible in the past to allow time and skill for the toilet of the horse's feet, so will it be found possible in the future to provide for a measure which will often save his life.

IV.

REVISED ARRANGEMENTS FOR THE CONTROL OF GLANDERS AMONG
ARMY HORSES AND MULES. (A.C.I. 161 OF 1918.)

A.C.I. 1405 of 1917 is hereby cancelled and the following instructions are issued for guidance in extension of para. 58 Regulations for the Army Veterinary Service :—

1. The intradermal palpebral test will only be used where horses and mules are being tested in large numbers. When comparatively few animals are being tested the subcutaneous method will be employed.

2. All remounts, whether on purchase within the United Kingdom or on arrival by sea, will be tested with mallein as soon after receipt as possible.

3. All remounts will be tested with mallein on joining units from remount depots unless it is stated on A.F. O.1640 that they have been recently tested at the issuing depot, when they will be tested two weeks after the date of the last testing.

4. All animals will be tested with mallein before going overseas. In the case of remounts passing from another depot through the depot at Swaythling, the testing should as far as possible be done at the depot of origin, but in any case the Commandant, Remount Depot, Swaythling, should be informed.

5. All animals received by remount depots from field units will be tested with mallein as soon after receipt as possible unless it is stated on A.F. O.1640 that they have been recently tested at the issuing depot, when they will be tested two weeks after the date of the last testing.

6. Animals admitted to veterinary hospitals will, as far as possible, i.e. whenever their condition permits, be tested with mallein on admission, in a part of the hospital specially set apart for that purpose.

7. When at the time of admission to hospital the condition of the patient does not permit of the test being made, the animal will be tested as soon thereafter as possible.

8. On the fourteenth day after the first test in a veterinary hospital the animal will be retested wherever located.

9. All animals will be tested with mallein before being discharged from veterinary hospitals unless they have been tested within fourteen days of the date of their discharge.

10. All cast animals which are destined to be sold, or slaughtered for human food, will be tested with mallein and certified to have passed the test before being sent to any place for sale or slaughter.

11. All animals which it is proposed to transfer or loan to a civil authority or to private individuals, or to board out with civilian allottees, will be tested with mallein and certified to have passed the test before such animals are allowed to leave their military quarters. This instruction does not apply to horses purchased under W.O. letter 116/Gen. No. 6358 (Q.M.G. 4) of 30th July, 1917, which may be temporarily accommodated in remount depots.

12. When an animal gives a typical reaction to mallein, and the administrative officer A.V.C. is satisfied that the test has been properly carried out, he will order the animal's immediate destruction.

13. When an outbreak of glanders occurs, all possible in-contacts will be tested with mallein without delay. The in-contacts will be isolated and will be retested on the fourteenth day after the first test. If any animal reacts to either of the tests it will be destroyed, if the administrative officer A.V.C. dealing with the outbreak is satisfied that the test has been properly carried out.

14. In every case of destruction of a mallein reactor a post-mortem examination will be made, and a brief report forwarded through the usual channel to the War Office.

15. Where animals have not reacted to mallein but are destroyed on developing symptoms which simulate those of glanders, material for bacteriological examination will invariably be forwarded to the Army Veterinary School, Aldershot, with the least possible delay. This material will be carefully packed and will be accompanied by a short history of the case.

116/Gen. No./6553 (V.D.).

APPENDIX E.

REPORT BY MAJOR F. J. McCALL, A.D.V.S., EAST AFRICAN FORCE, ON KURASSINI MILITARY DAIRY, FOR HALF YEAR ENDING JULY 5TH, 1918.

When the question of starting a dairy at Dar-es-Salaam was first raised, it was not anticipated or intended that the project should reach the ambitious proportions which the scheme as finally decided upon assumed.

The provision of fresh milk for the worst cases in hospital was the most that it was hoped to achieve, and it was only suggested that stabling might be arranged for 12 cows to meet this urgent need.

As it happened, however, on the same day as this original recommendation went forward, notice was received from the War Office that an endeavour must be made to curtail the demand for tinned milk then being forwarded to the Home Authorities.

The D.A. & Q.M.G. of that period, General Sir R. H. Ewart, then decided to cable to South Africa for 100 cows and 2 bulls, and accordingly an order was dispatched for 100 "grade" Friesland cows and 2 Friesland bulls, and it was stipulated that these should be due to "calf down" about one month after landing; a proviso was also made that the cows should be young and coming to their second or third calves.

It will thus be seen that the question resolved itself into whether the production of milk at Dar-es-Salaam was a feasible project, irrespective of the relative cost of the fresh and the tinned article.

That it has been proved possible, we are, I think, now in a position to affirm.

With regard to cost, it must be remembered that overflowing, as the hospitals were with cases of dysentery and malaria, the provision of an ample supply of fresh milk was in the nature of a god-send; and I am assured by the medical officers in charge of the various hospitals that the benefit which accrued to the patients cannot be over-estimated.

When it is realised that since the inauguration of the dairy a pint of fresh milk daily for each patient has been available for over fourteen hundred and fifty cases, it will be conceded, I think, that the case has not been overstated, and that the saving of many lives which might otherwise have been lost makes the question of cost one of secondary importance.

In view of these circumstances, the fact that it is possible to show that the dairy has been run as a commercial success is all the more gratifying.

ARRIVAL OF CATTLE.

Ninety-four cows, 2 bulls and 23 calves were landed in Dar-es-Salaam on the 2nd of January, 1918, from H.T. "Hymettus."

The cows and bulls were in good condition and had been well selected, but were decidedly older than the order stipulated; they were, however, animals of good "dairy type" and a fairly even lot.

The price averaged out at £29 7s. 4d. a cow in Durban, and, allowing for the class of animals, I consider them to have been a good purchase; the bulls cost £45 and £25 respectively.

The original intention, as stated, was that the cows should calve down about one month subsequent to being landed in this country; it was thus hoped that the animals would be acclimatised slightly to the heat of Dar-es-Salaam before the calves were born.

Owing, however, to unavoidable delay in shipping, many calved at Durban and on the ship.



A bull of the Kurassini Military Dairy herd.



Cows and calves of the herd.



Natives employed on milking duties.



The interior of the cow byre.

The great heat and unfavourable conditions under which these unfortunate calves first saw light of day ultimately caused the death of a considerable number from "white scour" and "navel ill," contracted at Durban or on the ship, and from "premature births" brought on by the heat and vicissitudes of the voyage.

These deaths occurred during the first fortnight after landing, but since then the calves have thriven well, only two having died subsequent to that period.

The chief reason why cows which had already calved were not brought in preference to "in calf" cows was that, as is well known, many South African cows will not yield milk when separated from their calves.

In addition it was realised that the profit derived from the sale of the calves would considerably reduce the cost of milk produced, and further that the introduction into British East Africa of a large number of well-bred stock would be of great benefit to the Protectorate.

PERSONNEL.

The European staff consists of one regimental sergeant-major and two corporals, and I would record here my appreciation of the loyal manner in which these have carried on the work of the dairy often in most disheartening and adverse circumstances; for example, of the 18 Cape boys who were engaged for milking, within 16 days all were in hospital except one, and the teaching of local natives in this short time presented a very delicate problem indeed.

However, after the local boys got settled down, understood the absolute necessity of thoroughly milking out and stripping the cows, and realised that nothing short of perfect cleanliness would suffice, the trouble taken in teaching them was more than amply repaid; at present the work goes forward with clock-like regularity.

Sickness.—The alarming prevalence of fever amongst the Cape boys speedily made it evident that their services could not be utilised profitably.

One died, and the others, except two, have been returned to the Union of South Africa.

Malaria is not confined to the Cape boys only, and it can be accepted that all establishments must allow for at least one-fifth of the staff being off duty or in hospital.

BUILDINGS.

The site selected as most suitable for the dairy was Kurassini Mission Station, which is situated about two miles from the hospitals in Dar-es-Salaam.

The cow sheds there were renovated and put into thorough sanitary condition, and all roofs were covered with a six-inch layer of grass to keep out the rays of the tropical sun.

The buildings as now altered comprise one large byre with four rows of stalls accommodating 66 cows, and also a number of converted outhouses in which the remainder of the milk cows, the bulls and calves are stabled; in addition, two "loose boxes" for the cows to calve down in and an isolation box for sick animals were also fitted up.

Ventilation in a hot, steamy climate such as that of Dar-es-Salaam is of paramount importance, and to minimise obstruction to air currents all stalls were constructed with open rails and walls, and gables of the buildings were knocked down to within three feet of the ground.

It must be borne in mind that economy was the watchword, and that no elaborate expenditure could be countenanced in view of the purely temporary nature of the enterprise.

METHODS OF MANAGEMENT.

All cattle are stabled and are fed entirely under cover. Two paddocks are utilised for exercising morning and evening, and in these an abundant supply of running water is laid on by pipes from a bore on the premises.

Daily Routine.—The cows are fed at 3 a.m.; milking commences at 4 and is finished about 5.30, when the animals are turned out into the paddocks; the byres are then cleaned out and washed down with dilute disinfectant, and at 8 a.m. the cows come in, are fed, groomed and allowed to rest, all work being stopped until 2 p.m., when the cows are again fed.

Milking begins again at 3 p.m. and is finished at 4.30, when the cows are again turned out into the paddocks until 6.30.

All byres are again cleaned and washed out; the cows come in, are fed, given fodder, and work is finished for the day.

As is the case all the world over, dairying is an arduous occupation, and one from which no relaxation can be obtained; the work must go on on Sundays and holidays as usual, and this entails a long daily round of duty from 3 a.m. until 7.30 p.m., which amounts to 16½ hours.

However, the work is congenial to natives, and possessing as they do the ability of sleeping at all sorts of odd hours they thrive and are contented.

Cleanliness.—Before milking, all boys wash themselves and change into white smocks, and as this practically constitutes their clothing the result is satisfactory.

All cows prior to milking have their udders and tails washed with a mild disinfectant solution and soap.

Delivery.—The milk is delivered in 10-gallon cans, which are fitted with adjustable double-sealed filters, and these cans are boiled in toto.

The milk is delivered at 6 a.m. and at 5 p.m. direct to the hospitals by the dairy cars, and a receipt is obtained for each can, stating that the contents have been received in good, fresh and sweet condition.

The milk of each cow is weighed every morning and evening, and a record is kept of the yield of each animal.

Feeding.—Owing to the prevalence of rinderpest, trypanosomiasis, and tick-borne diseases, such as East Coast fever, redwater, anaplasmosis, etc., and also on account of the heat of the tropical sun, no animals are grazed and all food is either imported or grown on the dairy farm.

DAIRY FARM.

This farm has proved a great success and all manure from the byres is carted direct on to the land twice daily, thus inhibiting the formation of fly-breeding grounds, as no manure heaps, etc., are allowed to accumulate.

The soil on the coast is almost pure sand, but by using an abundance of manure and by irrigation, good crops have in many instances been grown, and a daily allowance of at least 1,000 lb. of green mealies and native beans has been available since the farm was started.

Value of Green Foodstuffs.—The value of this greenstuff cannot be overestimated, as it not only effects a very great saving of imported foodstuffs but also stimulates the flow of milk and increases the digestive value of the other dry foods.

A small round native bean, almost like a cow pea in appearance, locally known as munde, has proved itself a most valuable asset as green food for cattle on the coast.

It will grow in practically pure sand and if manured will do so luxuriantly; a great drought-resister, it flourishes where beans of the Canadian Wonder type or mealies or vetches cannot live; the plant attains a considerable size and several tons an acre of luscious green fodder can be reaped within three and a half months of sowing; cattle soon become very fond of it, and undoubtedly it is a good milk producer.

The area under irrigation is about 5 acres, and in addition there are about 7 acres not under water.

A very considerable amount of labour was entailed in bringing this land under irrigation, and a proportion of the cost together with a sum representing unexhausted manure is carried forward on the credit side of the balance sheet.

This is justifiable, as undoubtedly during the next six months a very considerable benefit will be reaped from this form of development, and the greenstuff should be produced at less than a third of the cost entailed per ton during the first six months.

Indeed, if the enterprise was a purely commercial nature, I am confident that practically all foodstuffs could be grown or purchased locally.

WAR PRICES.

When reviewing the balance sheet it should be clearly borne in mind that since we are compelled to pay war prices and to provide transport for all foodstuffs and labour we should be also entitled to charge war prices for our products.

To illustrate the bearing which these enhanced prices have on the scheme I will mention one instance.

Motor Cars : in ordinary circumstances in civil life the population would be well pleased to have their milk delivered by 7 a.m., and undoubtedly, were the dairy worked on a purely commercial basis, one Ford car and one native driver could do the work.

Instead of this, however, we must have all milk delivered by 6 a.m., and as European drivers only are allowed to manipulate the cars, we are saddled with this additional expenditure.

COMPARISON OF THE PRICE OF TINNED AND FRESH MILK.

Tinned condensed milk costs 1s. 1d. per pound or 10s. 8d. per gallon landed in Dar-es-Salaam.

One gallon of condensed milk equals three to four (say three and a half) gallons of fresh milk ; thus one gallon of fresh milk at this price works out at 3s. 0½d.

The official price of fresh milk in Dar-es-Salaam authorised by the Base Office is 4s. per gallon.

The tables which I submit will show :—

1. The return from sale of milk sold at actual cost.
2. The return from sales at equivalent tinned milk prices.
3. The return at local authorised prices such as are obtained by other dairies in Dar-es-Salaam.

As the lessons learned from experience gained from the working of this dairy may be helpful in the event of projects under similar conditions being undertaken elsewhere, it would seem advisable to enumerate the most important points :—

1. Purchase only the very best types of milking cows.
2. Ventilation, shade and sound flooring should constitute the salient features of all buildings, and these should never be constructed for more than two rows of cows.
3. Attempt to grow or purchase all foodstuffs locally.
4. Exercise the cattle from 5 a.m. to 8, and from 5 p.m. to 6.30, and provide abundance of water.
5. Cattle should be brought to the dairy at least a month before calving.
6. Calves should not be fed out of the pails until they are at least one month old. The cow should be milked three parts dry and then the calf turned in beside her and left there for two hours. In tropical climates, calves are prone to suffer from diarrhoea and digestive troubles, and should be fed three times a day for the first month.
7. Local natives, no matter of what tribe, can be speedily taught to milk satisfactorily in the conventional manner, provided the instructor has patience and is not too quick-tempered.
8. Feed regularly at frequent intervals, giving small amounts such as are eaten up with avidity.

9. Remove each day all manure to a distance of at least a quarter of a mile, and thus prevent the formation of fly-breeding places; the most suitable manner of disposing of manure is to spread it straight away on the cultivated lands.

10. Isolate all buildings and paddocks by means of a byre fence, and do not permit strange cattle to enter the premises.

11. Last, but most important of all, insist on cleanliness and use common sense.

In conclusion it may be stated that only two cows have died since landing, one from parturient apoplexy, the other from pneumonia. One bull was slaughtered owing to an accidental injury to his fore leg.

AMOUNT AND COST OF FOOD CONSUMED BY KURASSINI CATTLE.

From January 2nd to June 30th, 1918.

	No. of lbs. Consumed.	Price per per 100 lb.	Cost of Food.	Average lb. a day.	Average cost per animal a day.
Purchased imported foodstuffs :—		<i>s. d.</i>	<i>£ s. d.</i>		<i>s. d.</i>
Bran	97,000	9 2½ 6	446 4 0	5.55	
Oats	83,100	14 3½ 4	592 15 8	4.76	
Mealie meal ...	97,010	11 2½ 4	541 19 4	5.55	
Mealies	2,050	11 2½ 4	11 9 0	.17	
Oat hay	42,100	6 1½ 4	129 2 0	2.41	
Teff hay	6,200	6 1½ 4	19 0 3	.36	
Lucerne	230,000	6 1½ 4	705 6 8	13.16	
Teff grass (bed- ding).	19,000	2 8	25 6 8	1.09	
Goor	10,030	8 0	40 2 8	.58	
Compressed fodder	54,192	5 4	144 10 0	3.10	
Salt	2,850	3 4	4 15 0	.16	
Nut cake	9,500	9 6	45 2 6	.54	
	653,032	—	2,705 13 9	37.43	3 1½
Locally grown foodstuffs :—					
Green mealies and beans	172,800	1 7¾ 5	*143 4 0	10.00	0 1¼
Totals	825,832	—	£2,848 17 9	47.43	3 2¾
Purchased imported foodstuffs :—					
<i>Calf food :</i>					
Calf meal	10,000	9 6	47 10 0	.92	
Linseed	50	12 6	0 6 3	.047	
Totals	10,050	—	£47 16 3	.967	0 10½

* The local-grown fodder from irrigation farm cost £143 4s. 0d., as shown in the account, and is made up from :—

	<i>£ s. d.</i>
Wages	65 0 0
Rations	68 0 0
Transport	9 9 0
Implements	0 15 0
Total	£143 4 0

When reviewing this "Daily Ration List" it will be observed that the ingredients are not altogether balanced in their correlation one to the other to the extent that might be desired.

It must not be forgotten, however, that the best had to be made of the material to hand.

The lucerne undoubtedly bulks too heavily in the ration and could have been advantageously substituted to a large extent by increased quantities of good teff hay, oat hay or compressed fodder, but these were only procurable in small quantities.

The bran ration again is high, but this is an advantage in view of its laxative and cooling properties.

The oats are an expensive ration and might have been substituted by bean meal or nut cake, but the former was not available and the latter was so only to a small extent.

Taken all in all, however, it may be deemed that the food was good though expensive; that it agreed with the cows is evident from the milk supply and the condition of the animals.

WEEKLY RETURNS OF MILK SUPPLIED TO HOSPITALS FOR SIX MONTHS,
FROM JANUARY 8TH, 1918, TO JULY 5TH, 1918, INCLUSIVE.

<i>Week ending :—</i>	<i>Gallons.</i>	<i>Week ending :—</i>	<i>Gallons.</i>
January 8th, 1918, to	1,385	Brought forward	16,404
January 18th, 1918.		April 19th, 1918 ...	1,317
January 25th, 1918 ...	1,077	„ 26th „ ...	1,328
February 1st, „ ...	1,192½	May 3rd „ ...	1,340
„ 8th „ ...	1,280	„ 10th „ ...	1,305
„ 15th „ ...	1,306	„ 17th „ ...	1,290½
„ 22nd „ ...	1,321	„ 24th „ ...	1,335½
March 1st „ ...	1,329	„ 31st „ ...	1,374½
„ 8th „ ...	1,308	June 7th „ ...	1,417
„ 15th „ ...	1,250	„ 14th „ ...	1,481½
„ 22nd „ ...	1,219½	„ 21st „ ...	1,483
„ 29th „ ...	1,225½	„ 28th „ ...	1,503
April 5th „ ...	1,231½	July 5th „ ...	1,505
„ 12th „ ...	1,279		
Carried forward	16,404	Total ...	33,084

COST ACCOUNT.

Dairy.

To Purchase of Animals.				By Stock on Hand.			
	£	s.	d.		£	s.	d.
3 Bulls at £45, £25, £40	110	0	0	2 Bulls	85	0	0
94 Cows at £29 7s. 4d...	2,760	9	4	92 Cows at £29 7s. 4d.	2,701	14	8
				5 Calves at £15 ..	75	0	0
Improvements to Buildings	200	0	0				
Motor Cars	300	0	0		2,861	14	8
			500	Crops to be reaped ..			60
Equipment			200	Sale of 51 Calves at £15	765	0	0
Foodstuffs			2,753	1 Bull slaughtered,			
				800 lb. dead weight..	15	0	0
Wages—							780
5 Europeans for 6 months	193	0	0	Buildings	200	0	0
18 Cape Boys for 1 month	72	0	0	Motor Cars	300	0	0
35 Natives at 7 Rs. per month for 6 months	98	0	0	Equipment	200	0	0
			363	Mules, Carts and Plough	126	0	0
Rations—				Tools and Implements	5	0	0
5 Europeans for 6 months	60	0	0				831
18 Cape Boys for 1 month	18	0	0	Less 15 per cent. Dep. for 6 months ..	62	6	6
35 Natives at 7.50 Rs. per month for 6 months	105	0	0	Cost of Production of Milk			3,312
			183				12
Delivery of Milk, 200 galls. 16 miles daily; 240 galls. Petrol ..			24				8
Carriage of Calves to Mombasa from Dar-es-Salaam			51				
Incidental Expenses ..			100				
Irrigation Farm Wages—							
1 European for 4 months at £6 5s. 0d.	25	0	0				
30 Natives for 4 months at 5 Rs. ..	40	0	0				
			65				
Rations—							
1 European for 4 months at 30 Rs..	8	0	0				
30 Natives for 4 months at 7.50 Rs.	60	0	0				
			68				
Tools and Implements..	5	0	0				
Mules, Carts and Plough	126	0	0				
			131				
Depreciation written off—							
Stock	411	15	0				
Buildings	15	0	0				
Equipment	15	0	0				
Motor Cars	22	10	0				
Mules, Carts and Plough	9	16	6				
			474				
			£7,788				£7,783
			0				0
			10				10

Production of fresh milk=33,084 gallons, costing as shown, £3,312 12s. 8d., which equals 2s. 0.03d. per gallon.

Compared with this, tinned condensed milk costs 10s. 8d. per gallon purchased from the Supply Depot. This, when diluted three and a half times, costs 3s. 0½d. per gallon of fresh milk equivalent. The authorised local price for fresh milk is 4s. 0d. per gallon.

Therefore, the saving effected during the past six months by running the dairy is (1) £1,719 2s. 8d., assuming tinned milk had been used, or (2) £2,804 3s. 8d. had local fresh milk been used.

In addition to this saving it must be remembered that the following assets are still on hand while the outstanding liabilities are nil :—

					£	s.	d.
Cattle	...	...	...	...	2,449	19	8
Crops	...	...	...	...	60	0	0
Buildings	...	...	...	...	185	0	0
Equipment...	...	...	...	...	185	0	0
Motor cars	...	...	...	...	277	10	0
Mules, carts and plough	...	...	...	...	116	11	0
Improvements to Irrigation Farm					50	0	0
					<hr/>		
					£3,324	0	8
					<hr/>		

The cost of transport of cattle from Durban to Dar-es-Salaam has not been debited as the enhanced value of the animals in East Africa will more than counterbalance the expense incurred.

The official recovery cost of transport is 10 per cent.

Depreciation at the rate of 15 per cent. has already been written off.

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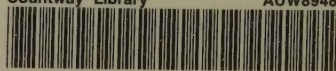
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